

TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

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SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS †

GENERAL

A book on the parasitological and clinical aspects of helminthiasis has been written (in Spanish) by APARICIO GARRIDO and PRIETO LORENZO (p. 1110).

MAY (p. 426) has published a map of the world distribution of helminthiasis.

Modern views on immunity and helminth infection are discussed by WETZEL (p. 222). This immunity is usually provoked by repeated invasions from outside, not, as in bacterial and virus infections, by multiplication of the organisms of the body. Resistance is probably the result of antibodies developed in response to the antigens of the secretions and excretions of the worms.

DAUGHERTY (p. 227), in an investigation of intermediary protein metabolism in helminths, has made a study of transaminase reactions by a technique involving filter paper chromatography.

TREMATODES

*Schistosomes**General*

The Report of the Expert Committee on Bilharziasis of WHO (p. 1151) is very comprehensive. It deals with epidemiological surveys and diagnostic methods, with the need for study of snail hosts, with the difficulty of control (noting that pentachlorophenate appears to be the most practical compound for flowing water, killing snails at 10 p.p.m.), and with treatment (sodium antimony tartrate is recommended, in spite of its disadvantages).

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1953, v. 50. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

COUTINHO (p. 822) describes a new method of preparing an antigen from adult schistosomes, for use in the intradermal test. ROTH (p. 1154) gives a general account of the X-ray appearances of the lungs in schistosomiasis. GIRGIS (p. 38) describes cases of heart disease due to repeated and massive invasion of the pulmonary tissues by eggs of *S. haematobium* or *S. mansoni*; dyspnoea and palpitation, with pain, cough and haemoptysis, were prominent.

In Egyptian splenomegaly perisplenitis is common, and splenectomy may therefore be impracticable. GALAL (p. 225) has performed ligation of the splenic artery as a substitute for splenectomy, but the ultimate results remain to be seen.

In Israel KARIV (p. 1059) studied the action of tartar emetic on the heart. Disappointing results were obtained by ALVES and GELFAND (p. 128) in the treatment of schistosomiasis with trivalent sodium antimony tri-gluconate given by mouth. ANTAKI (p. 530) shows that when the antimony content of blood was measured (by a polarographic method), wide individual variations were found in different patients undergoing treatment with Stibophen.

In a discussion of the nomenclature of African snail hosts of schistosomes SCHWETZ (p. 38) defends classification based on conchology, on the grounds of practical use and correspondence with ecological variations. [Such a classification has been criticized by some other workers.] ALVES and CLARKE (p. 729) have compiled a key to the Families of some African Gastropods; it incorporates the genera of snail hosts of schistosomes.

A short book on molluscicides has been written by MOZLEY (p. 321). HOFFMAN and ZAKHARY (p. 733) show that in tests of the molluscicidal activity of copper sulphate, the use of tap water gives more favourable results than the use of natural water. They suggest also that low concentrations maintained for a long time may be more effective than the high concentrations which result when copper sulphate is dissolved directly in canal water. In spite of its value as a molluscicide, copper sulphate has not permanently reduced the number of snail hosts in Egypt. A possible reason is the action of local waters in reducing its potency, and GINDY (p. 1156) shows that in Nile water an initial concentration of 30 p.p.m. was reduced to 19 p.p.m. after 1 hour, and to 3.9 p.p.m. after 72 hours. Silty water had even greater effect.

Schistosoma haematobium

WATSON has made a number of surveys of schistosomiasis in the Near East. In the valley of the Tigris and Euphrates the new irrigation schemes provide new habitats for the snails, and in a review of the position there he (p. 37) points out the dangers involved. In Baghdad this infection was found in 34 per cent. of children and men living in mud huts on the outskirts of the city, and he (p. 223) comments on the increase in numbers of *Bulinus truncatus* in the local waters. Hitherto it has been thought that schistosomiasis was predominantly a disease of youth, but WATSON (p. 1058) in Iraq found no difference in incidence in the various age groups. He (p. 953) made a survey of children, clinic patients and labourers on Abadan island in South Persia, and in the district of Ahwaz, but obtained only negative results. *Bulinus truncatus* is present in marshes not far away, but the salinity of Abadan water, which is affected by tidal action, probably is inimical to the snail, though this is not true of Ahwaz.

Summing up the schistosomiasis situation of Morocco, GAUD (p. 527) comments that urinary schistosomiasis is not a major health problem there.

Very heavy incidence rates of *S. haematobium* infection were found by ZAHRA (p. 630) in part of the Southern Cameroons where species of *Bulinus* were numerous in the lakes of the area.

GREANY (p. 726) gives an account of schistosomiasis in the irrigated Gezira area of the Sudan, where both *S. haematobium* and *S. mansoni* are found, the general rates being 8.86 and 8.77 per cent. respectively, though higher in children. The only factor which seemed to influence incidence was distance of the village from a canal. Conditions permit transmission throughout the year. Snail control is attempted in the smaller canals by the use of copper sulphate; the importance of the association of weeds and snails is discussed, and the possibility of snail control by means of weed control.

LIPPARONI (p. 529) shows that urinary schistosomiasis is common in Somaliland, and notes that *Bulinus abyssinicus* is found in various waters of the area. In part of Mozambique investigated by DE AZEVEDO (p. 729) the incidence of *S. haematobium* infection varied from 26 to 96 per cent. of the people examined. The higher figures were from people using ditch water and canal water, the lower from people using lake water from sandy beaches not favourable for snails. *S. haematobium* infection was found in 10-20 per cent. of schoolchildren in country north of Johannesburg. The snails of this area are heavily infected with *S. bovis*, but human infection with it was found only once.

A focus of urinary schistosomiasis in Bombay State, India, which has been described before, was studied by GADGIL and SHAH (p. 317) who found ova with terminal spines in the urine of some 250 persons, and cercariae resembling those of *S. haematobium* in certain snails of the family Ampullariidae.

MOORE *et al.* (p. 954) have been able to demonstrate that *Bulinus truncatus* is considerably more susceptible to infection with *S. haematobium* during the first few days after hatching than when it is older. Snails which discharge the cercariae under laboratory conditions do not live long, but the reason for this is not clear. In the Fezzan there is no evidence that *S. mansoni* exists, but *S. haematobium* is found, and VERMEIL *et al.* (p. 725) give an account of the distribution of the *Bulinus* snails of the region. They note that the snail hosts are not found in waters where chlorine and sodium ions are above a certain level.

Having found negative results with skin tests in which a cercarial antigen is used, in African children with eggs of *S. haematobium* in the urine, LURIE *et al.* (p. 729) conclude that this test cannot be relied upon to exclude schistosomiasis.

In an attempt to assess the amount of blood lost in *S. haematobium* infection, GERRITSEN *et al.* (p. 730) calculate that it varied between 1.3 and 6.1 ml. *per diem* in the African adult males studied. The blood haemoglobin values were mostly normal. They make the point that urinary discharge of eggs is very variable, and that single examinations of urine may be unreliable in the diagnosis of the disease.

Genital infection with *S. haematobium* is common. CAMAIN (p. 1057) found it in 16 patients operated upon in Dakar; GRACE and AIDAROS (p. 38) describe the findings at autopsy on 119 males with involvement of the seminal vesicles; MOHAMMED (p. 427) shows that the vesicles are usually involved in schistosomiasis of the bladder, but the prostrate much less frequently. He discusses the pathological changes and the route of migration of the adult worms.

GELFAND and HONEY (p. 731) describe 3 cases of *S. haematobium* infection with dilatation of the ureter but without ureteral stricture.

GELFAND and ROSS (p. 956) studied post-mortem material from adult Africans in Southern Rhodesia and found that ova of *S. haematobium* and *S. mansoni* are often found in the small as well as the large intestine. In

persons infected with one or both of these parasites a pure *S. haematobium* infection was found in the genito-urinary tract in 68 males and 20 females, and a pure *S. mansoni* infection in 39 and 10; mixed infections were seen in 29 and 8, respectively. Lesions of the appendix due to *S. haematobium* were seen by EL ZAHAWI (p. 426) in a number of patients in Iraq.

A case of schistosomal heart disease, apparently due to *S. haematobium*, is described by VESELL and SCHACK (p. 318), and acute pneumonic changes by PAYET and CAMAIN (p. 318).

PADERSKI (p. 1059) describes the hepato-splenomegaly often seen in schistosomiasis, noting that ova were never, in his considerable series of biopsy specimens, found in the spleen, though common in the liver. Splenectomy may be indicated because of mechanical disturbance, bleeding oesophageal varices, progressive cirrhosis with ascites, and hypersplenism.

In the treatment of urinary schistosomiasis in Tanganyika SEITZ (p. 428) has obtained much better results with sodium antimony tartrate (intensive or longer courses) than with lucanthone [Miracil D, Nilodin]. He found that sugar-coated Nilodin tablets passed through the intestine unabsorbed. On the other hand, improvement is reported by GREMLIZA (p. 1058) in 10 patients with *S. haematobium* infection treated with Miracil D. The side effects of Miracil D may be troublesome, but HALAWANI *et al.* (p. 428) show that if *extractum belladonnae siccum* is given at the same time the toxicity of the drug is diminished.

In treatment of *S. haematobium* infection SIMÕES (p. 318) found that anthiomaline was valuable when given in courses of 9 or 10 injections, but he does not regard it as suitable for mass treatment.

RIEDEL (p. 530) found that when hexamine and ammonium sulphate were given to patients passing eggs of *S. haematobium* in the urine, the miracidia hatching from those eggs were apparently killed. There seems to be a possibility that in this way the spread of infection might be reduced.

S. mansoni

Various papers describing studies on *S. mansoni* carried out by PIRAJÁ DA SILVA (p. 1152) in the years 1908-16 have been republished. He first described the morphological character of *S. mansoni* in Brazil.

DE LUCENA (p. 531) has written a review of the epidemiology of *S. mansoni* infection.

For the first time autochthonous infection with *S. mansoni* has been reported from Israel, the infection probably having been acquired through bathing in a river near Tel-Aviv. FRANKL (p. 1154) thinks that the infection may have been introduced by immigrants, possibly from Yemen.

In dealing with the problem of immigrants into Israel who are infected with *S. haematobium* or *S. mansoni*, HELLER (p. 1058) has found that rectal biopsy and the hatching test of faeces are the most effective diagnostic methods, and tartar emetic (given in a prolonged course) the most effective treatment.

DELAHOUSSE (p. 224) discusses schistosomiasis in part of the French Sudan which is irrigated, pointing out that schemes for public works often create new epidemiological problems. In children (80 per cent. of whom show schistosome eggs in the faeces) an early stage of enlargement of spleen and liver is seen, and a rare late stage of cirrhosis which is usually fatal.

In two villages in the Belgian Congo PARENT and VERBRUGGEN (p. 527) found 59 per cent. with urinary and 42 per cent. with intestinal schistosomiasis. Eggs of *S. mansoni* type were occasionally found in urine, and

eggs with terminal spines occasionally in faeces. The authors did not concentrate the faeces and they think that the *S. mansoni* infection rate was in reality 100 per cent. They discuss prevention by education and raising the standard of living.

PITCHFORD (p. 727) writes of schistosomiasis in the Africans working on irrigated farms in South Africa, in whom the incidence of *S. mansoni* may be 60–70 per cent. On these farms there is little provision of latrines, and the faecal material which collects round the compounds is washed by subsequent rains into the canal-dam systems, and if bathing is permitted the infection is spread. Copper sulphate is used for snail control in some places, but the author is not optimistic, and thinks that the demand for more water will mean a progressively disease-ridden population.

A new focus of intestinal schistosomiasis is recorded by BURNOD (p. 728) in Madagascar.

A serious focus of *S. mansoni* infection has been found in part of the Dominican Republic (COUTINHO, p. 319); and OLIVIER *et al.* (p. 39) show that a large proportion of children are infected.

FAIN (p. 39) found *Biomphalaria alexandrina tanganyicensis* infected with *S. mansoni* in the Belgian Congo, and proved it susceptible in the laboratory.

The internal structure of *Australorbis glabratus* from various parts of Brazil has been described by BARBOSA and DOBBIN (p. 1153), and the growth curves of specimens of this snail by BARBOSA and DA SILVA (p. 1153). The respiration of the infected snails, and the resistance to drying, are discussed by BARBOSA and his colleagues (p. 1154).

In a study of the susceptibility of a Puerto Rican and a Brazilian strain of *Australorbis glabratus* to a Puerto Rican strain of *S. mansoni*, NEWTON (p. 224) shows that in the resistant Brazilian snail there is a vigorous tissue response which does not occur in the susceptible Puerto Rican snail.

Tropicorbis havanensis has been tested for susceptibility to *S. mansoni*. With an Egyptian strain of *S. mansoni* its susceptibility varied according to its origin (though strains of *Australorbis glabratus* were equally susceptible regardless of origin) (KUNTZ, p. 40); most of the schistosome larvae were killed within a few days after penetration into *T. havanensis* (Louisiana strain), and there was evidence of tissue response which was not seen in *Australorbis glabratus* (BROOKS, p. 731). When *T. havanensis* was repeatedly exposed to *S. mansoni* the proportion infected became progressively higher with the number of exposures, and McQUAY (p. 1060) found that adult snails and large juvenile snails were more susceptible than younger snails [compare *Bulinus truncatus* (MOORE *et al.*), above].

Various genera and species of Cuban snails were tested by PEÑALVER (p. 224) for susceptibility to *S. mansoni*, without success.

STIREWALT and EVANS (p. 223), by a streptococcal decapsulation test, have demonstrated an enzyme in cercariae of *S. mansoni*. Its action resembled that of a hyaluronidase of bull testis. BUEDING (p. 224) shows that *S. mansoni* contains a specific acetylcholinesterase.

Animals infected with *S. mansoni* were treated by BUEDING *et al.* (p. 533) with a cyanide dye with the object of interfering with the respiratory process of the worms. The authors conclude that oxidation metabolism is not important to *S. mansoni*.

Experiments carried out on laboratory animals by OLIVIER and SCHNEIDERMAN (p. 732) show that they develop resistance to superinfection with *S. mansoni*, but STIREWALT and EVANS (p. 533) failed to protect mice against *S. mansoni* by transfer of immune rat serum.

Extract of dried and powdered cercariae of *S. mansoni* were used for skin tests by OLIVER-GONZÁLEZ (p. 632) in patients infected with that worm, and positive results were obtained in 95.5 per cent. Similar results were obtained 4 years after treatment, and it seems either that schistosome eggs continue to sensitize the patients or that there are adult worms which cannot be detected by examination of faeces or biopsy. Tests with extracts of *Fasciola hepatica* were not so successful.

PESSOA (p. 1059) has not found the formol-gel reaction useful in *S. mansoni* infection.

An account of the clinical features of *S. mansoni* infection in the Sudan is given by GREANY (p. 528) who, in diagnosis, used stool examination methods, sigmoidoscopy and rectal biopsy. In treatment he found that short intensive courses of various antimony preparations were unsatisfactory, and he preferred the usual protracted course of tartar emetic, but the prognosis of *S. mansoni* infections is much less favourable than that of *S. haematobium* infections. He discusses the aetiology of cirrhosis of the liver in this area, where the standard of nutrition is good, and makes the point that in the absence of schistosomiasis cirrhosis is not found.

OTTOLINA (p. 531) in a long paper describes his method of estimating the extent and weight of *S. mansoni* infection by detailed examination of large portions of rectal mucosa removed at post-mortem examination, and by comparing the findings with those of examination of rectal biopsy specimens. The method involves the actual counting of worms and eggs in the mucosal sheets. He shows that biopsy was positive in all patients found positive by the much more extended post-mortem examination. The distribution of worms and eggs in the rectal mucosa is described.

DIAS (p. 365) has written a long thesis on the liver and spleen in *S. mansoni* infection, in which he points out that though hepatomegaly precedes enlargement of the spleen, it is the splenic condition which in the long run predominates. Signs of hypersplenism may arise, including leucopenia and anaemia. Treatment is described, including splenectomy, which relieves portal stasis.

ALTMANN and GÖNNERT (p. 1061) describe the changes which occur in the liver in the neighbourhood of the worms and eggs after infection with *S. mansoni*. PEREIRA and NETTO (p. 824) describe 3 cases in which the pancreas was involved in *S. mansoni* infection; the condition was acute in 2 of these patients.

BARBATO (p. 822) has written a thesis on the pathology of the lungs in chronic *S. mansoni* infection, and on cor pulmonale. In the lungs the infection may lead to granulomatous changes or changes in the smaller arteries. The physical signs are attributed to the pulmonary condition, notably pulmonary hypertension. The predominating symptom is dyspnoea.

Myocardial degeneration was found by PIFANO and MARCUZZI (p. 202) in white mice infected with *S. mansoni*.

ABBOTT and SPENCER (p. 957) describe 2 cases of transverse myelitis due to eggs of *S. mansoni*, in one of which the eggs were found in granulomatous areas of the spinal cord. The patients were Sudanese and paraplegia is not uncommon there; it may be that the cause is schistosomiasis more often than is suspected. In the second case treatment with antimony produced marked improvement. DE ROCHA and ROEDEL (p. 1155) describe a case of *S. mansoni* infection of the spinal cord.

STANDEN (p. 732) describes the course of *S. mansoni* infection of mice, and his method of assessing the value of new drugs being tested in this infection, which involves close observation of the position of the worms

(which tend to become paralysed by the drugs, and to be swept back towards the liver) and their viability. Female worms seem to be killed by drugs more easily than male worms. The paper contains much detail.

FAIN and LAGRANGE (p. 40) treated 33 patients, suffering from *S. mansoni* infection, with lucanthone (Miracil D or Nilodin) to a gross dosage of 120 mgm. per kgm. of body weight. Examinations carried out for several months showed that only 3 were apparently cured, though there was reduction in the number of eggs passed by all the patients. Glucantime has been used successfully in a case of intestinal and vesical schistosomiasis by MOLESE and CHIEFFI (p. 319). BELHOMMET (p. 957) used diethylcarbamazine in intestinal schistosomiasis, with good immediate result, in that eggs almost or entirely disappeared from the faeces. Of 10 patients examined 9-18 months later, 6 were still free.

After an experience of testing 701 compounds of phenolic type, NOLAN *et al.* (p. 1061) conclude that pentachlorophenol or its salts are the compounds of choice for control of *Australorbis glabratus*. NEWTON and HASKINS (p. 1061) have compared the mortality of several strains of *Australorbis glabratus* on exposure to sodium pentachlorophenate, finding considerable differences in the LD50 values.

JONES and NEWTON (p. 632) find that ozone in low concentrations in water is effective in killing cercariae of *S. mansoni*.

TOMBERG and LAGRANGE (p. 958) describe investigations on the action of ultra-violet and other rays on planorbid snails and on the cercariae of *S. mansoni*. Sterilization of swimming pools and still waters is practicable by these means.

DIAS (p. 825) has made a study of *Australorbis glabratus* and the bacteria which infect them and which under experimental conditions prove lethal to a high proportion of them. There are possibilities of control by this method.

S. intercalatum; *S. bovis*; *S. rodhaini*

LE GAC *et al.* (p. 631) claim that *S. intercalatum* infection has been found for the first time in Oubangui-Chari, and RAVISSE (p. 955) describes a case. FAIN (p. 429) describes the cercaria of *Schistosoma intercalatum* emitted by *Physopsis africana*.

KISNER *et al.* (p. 733) report a case of urinary-tract infection with *S. bovis*, from South Africa.

Cercariae of *S. rodhaini* have been found in *Planorbis tanganikanus* in the Belgian Congo; this appears to be a new snail host (SCHWETZ, p. 429).

S. japonicum

OLIVIER (p. 226) has studied the lesions caused by cercariae of *S. mansoni*, *S. japonicum* and *Schistosomatium douthitti* in the lungs of infected mice. Numerous haemorrhages were found, and a high proportion of the cercariae of *S. japonicum* and *S. douthitti* reached the portal system, but the passage of *S. mansoni* was slow, probably because it was in an abnormal host.

HUNTER *et al.* (p. 226) tested the susceptibility of *Oncomelania nosophora* and *O. formosana* to a Japanese strain of *S. japonicum*, and found that *O. nosophora* was easily infected but that *O. formosana* was not a suitable host for this strain.

McMULLEN (p. 41) gives an account of tests carried out on 413 mixtures for possible use against *O. nosophora*. Some dual mixtures were more toxic

than separate samples. In the laboratory the phenols predominated among substances giving the best results, and the dinitrophenols were the most active. They were also successful in the field, but other compounds may prove more practical.

HUNTER *et al.* (p. 129) have experimentally applied sodium pentachlorophenate (Santobrite) to soil (at a rate of about 390 mgm. per square foot) for the control of *O. nosophora*. The applications were made twice each year, to ditches and their banks, and the edges of rice fields, with attention to culverts, overhanging banks, and rodent burrows. The results were so favourable that the authors think that in this way schistosomiasis could be virtually eradicated from Japan by a programme lasting 5-7 years. At this concentration the substance was not pathogenic to man or stock, and although it killed many of the dicotyledonous plants it had little effect on the monocotyledons, and was not injurious to wheat and rice. The authors refer to the loss of working efficiency caused by schistosomiasis, but in comment Gordon remarks that in the Sudan he tried to obtain reliable evidence of loss of man-power due to schistosomiasis (*haematobium* or *mansonii*) without success.

In an investigation of potential molluscicides HUNTER *et al.* (p. 321) found that mixtures of certain chlorophenols were useful in controlling *Oncomelania*, but they make the point that the effectiveness of the chemicals is probably influenced by the nature of the plant growth and amount of soil moisture.

Schistosomes causing dermatitis

Schistosome dermatitis occurs in Australia, and in the Murray River area the organism is *Cercaria parocellata*, the host being *Limnaea leesonii* (MACFARLANE, p. 42).

ISHII and OGAWA (p. 320) discuss schistosome dermatitis in Japan; it is regarded as an allergic phenomenon resulting from the presence of the worms, or their products, in the tissues.

KAGAN (p. 131) discusses the immunity to superinfection conferred in mice after infection with *Schistosomatum douthitti*. KAGAN and LEE (p. 430) have used *Schistosomatum douthitti* for screening drugs for possible use in human schistosomiasis, and regard it as a useful test organism; there are many points of similarity with *S. japonicum*. Certain complex antimony compounds were found active.

Schistosome dermatitis in clam diggers working in sea water in the United States is described by ORRIS and COMBES (p. 42). STUNKARD and HINCHLIFFE (pp. 42, 1062) describe *Microbilharzia variglandis*, an avian blood fluke which causes schistosome dermatitis in sea bathers in the United States. The antigenic substances of marine and fresh-water avian schistosomes are very similar, if not identical, as shown by cross-sensitization studies.

Other trematodes

Paragonimiasis was found by KOMIYA *et al.* (p. 633) in up to 10 per cent. of the inhabitants of certain villages in Japan; the intermediate hosts are said to be *Eliocheir japonicus* and *Cambaroides clarki*. The crabs are usually cooked adequately, but the knives used to cut them before cooking, and the baskets in which the crab meat is placed, become contaminated by the metacercariae, which may then easily be transferred to the mouth.

MIYAKE and OIKE (p. 131) found a high incidence of paragonimiasis in part of Japan, and studied the X-ray appearances of this disease, which are not

yet well known. OIKE *et al.* (p. 322) found X-ray shadows in patients with sputa containing *Paragonimus* eggs, or positive to an intradermal skin test. The shadows were cystic, nodular or infiltrative. ROSS *et al.* (p. 634) describe the radiological appearances found in paragonimiasis.

WEINSTEIN *et al.* (p. 1062) tried lucanthone (Nilodin) in paragonimiasis, but without success. They report one case in which both lungs, and also the urinary tract, were infected by *Paragonimus*. KOMIYA *et al.* (p. 1063) find that emetine with sulphonamides are only moderately useful in paragonimiasis; search for other forms of treatment is essential.

The snail *Thiara granifera* occurs in Florida and also in the Philippines and other Pacific islands. ABBOTT (p. 43) describes it and shows that it is a host of *Metagonimus yokogawai* and *Paragonimus westermani*.

FU and MA (p. 734) appear to have been successful in the treatment of a patient with clonorchiasis by means of chloroquine.

A case of human infection with *Opisthorchis felineus* is reported by KNÖNAGEL (p. 959).

A fatal case of infection with *Fasciolopsis buski* is reported from Thailand by VIRANUVATTI *et al.* (p. 1064).

Five cases of *Fasciola hepatica* infection, all in one family, are reported from Colombia by MUÑOZ RIVAS (p. 218). Human infections with *F. hepatica* and (especially) *F. gigantica* have been reported from Hawaii by ALICATA (p. 634). Ectopic *F. hepatica* infection, the immature fluke being attached to the abdominal wall, is described by CATCHPOLE and SNOW (p. 43). The pharmacology of movement of the live fluke has been studied by CHANCE and MANSOUR (p. 825).

CESTODES

For the first time, plerocercoids of *Diphyllbothrium latum* have been found in fish in the river Elbe; KUHLOW (p. 735) thinks that they may only recently have been introduced. He discusses various species of *Diphyllbothrium*.

VON BONSDORFF and GORDIN (p. 44) and VON BONSDORFF (p. 736) discuss the mechanism of anaemia in *Diphyllbothrium latum* infection, and conclude that the worm assimilates a considerable amount of vitamin B12, which may explain why in certain circumstances it causes a pernicious form of anaemia. NYBERG (p. 534), writing to the same effect, reports the B12 content of *D. latum* and some other worms.

CHAVARRÍA (p. 227) comments on the heavy incidence of cysticercosis in pigs in Mexico, and its importance for man.

An unusual tapeworm, without internal or external segmentation, but which was probably an anomalous *Taenia saginata*, is described by HUSSEY *et al.* (p. 228).

WIGAND and WARNECKE (p. 959) used a benzine emulsion with some success in the treatment of *T. saginata* infection. TREVIÑO and SANDOVAL (p. 1064) used mepacrine successfully in a series of patients with tapeworm infections. The total dose for adults was 0.4 gm. divided into 4 doses taken at intervals of 5 minutes, each dose being accompanied by 0.6 gm. sodium bicarbonate. A saline aperient was given 2 hours after the treatment. GARCIA *et al.* (p. 960) used diiodophenyl propionic acid in the treatment of tapeworm infections of various kinds, with considerable success in patients in whom other treatments had been ineffective.

In Italy hydatid cysts were found by BIOCCHIA and MASSI (p. 322) in a high proportion of sheep examined, and also in cattle, horses and pigs. Dogs were found to harbour the adult worm, but not cats, wild cats, foxes or

badgers. SAGGESE (p. 962) reports a progressive increase in Italy, especially in farmers. In Canada, various animals carry adult *Echinococcus granulosus*, the most important being wolves, which contaminate the ground so that the eggs are picked up by moose and caribou, which are killed and eaten by wolves. This cycle itself is not of economic or medical importance, but MILLER (p. 1065) shows that dogs may become infected by eating moose or caribou lungs given to them by man, and the infection then tends to reach man. He describes a considerable series of cases, and on the whole thinks that the prognosis in pulmonary hydatid disease is not so bad as has been thought.

COUTELEN *et al.* (p. 44) describe the muscular system of the scolex of *Echinococcus*.

BENSTED and ATKINSON (p. 827) stress the need for standardization of reagents for the hydatid complement-fixation test and the intradermal test. They show that of 29 persons proved surgically to be infected with hydatid cysts 25 had positive complement-fixation tests and 25 positive intradermal tests. They describe their methods of preparation and standardization. BOCCHETTI and BEGANI (p. 323) studied the Casoni test in hydatid disease, making the point that it should not be repeated in the same person, as the intradermal injection of hydatid fluid itself leads to sensitization. Similarly the titre of the complement-fixation test may rise as a result of injection of hydatid fluid. NAQUIRA *et al.* (p. 535) have used a conditioned haemolysis test in the diagnosis of hydatid disease.

OSIMANI *et al.* (p. 736) describe the action of supersonic waves on *Echinococcus granulosus* cysts. The experiments indicate that the waves may have some value in treatment.

Cases of *Hymenolepis nana* infection, mostly from Latium, are reported by CICHINI (p. 1157) in Rome. They were usually in children, who complained of various intestinal disorders. AMARAL and PIRES (p. 826) show that infection with species of *Hymenolepis* is not uncommon in São Paulo, but that evidence of infection in examinations of faeces has been found erratic. Treatment was not satisfactory. VOGÉ (p. 132) discusses the variability shown by *Hymenolepis diminuta* in rats and squirrels.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

MALAYA, FEDERATION OF: Annual Report of the Malaria Advisory Board for the Year 1952 [LESTER, H. M. O., Chairman]. 33 pp., 1 diagram. 1953. Kuala Lumpur: Govt. Press. [\$1.50.]

Malaria in Malaya decreased from 1933 to 1950 except for an exacerbation during the war. In 1950 the number of admissions to hospital on account of malaria was 11,720; in 1951 there was an unexplained increase to 15,960 but during the year 1952 there has again been a slight decrease to 14,115 which is slightly below the 1949 figure. A detailed analysis of the figures

is given and from it it seems that there was a considerable epidemic in certain states which has now subsided.

The development of resistance to proguanil by *Plasmodium falciparum* and *P. vivax* continues, but despite this the drug remains valuable for prophylaxis. The 3-year experiment in control has ended and it is concluded that the residual insecticides can greatly reduce, though not eliminate, transmission by *Anopheles maculatus*. On the whole DDT was more effective than BHC but the latter might be preferable where there is no objection to frequent repetition of spraying. Dramatic results are not expected from the application of residual insecticides in Malaya, as other vectors of malaria are generally less readily killed than is *A. maculatus*.

The Report includes a copy of Circular No. 7 on "Malaria Control by Modern Methods". This Circular describes, largely in the form of question and answer, the properties of imagocides, larvicides and prophylactic drugs; the principles on which a choice between them should be made in different circumstances, and the degree of success to be expected from their use. It contains as an Appendix working details for the use of residual insecticides which would constitute an admirable background for the formulation of schemes and estimates for them, and for the training of staff. [Though written for Malaya this Circular deserves a much wider distribution; it was reviewed in this *Bulletin*, 1952, v. 49, 1098.] G. Macdonald

NAQVI, S. H. & QUTUB-UD-DIN, M. Revised by M. Z. Y. HUSAIN. **A Report on the Malaria Survey of Kohat-Hangu Valley, Kohat District, N.-W.F.P., Pakistan.** *Pakistan J. of Health*. 1954, Jan., v. 3, No. 4, 241-53.

The Kohat-Hangu Valley in the North-West Frontier Province of Pakistan is an arid region with an extreme climate, watered by hill streams and with sparse natural vegetation. There has been no previous full malaria survey. Malaria is believed to account for 80 per cent. of all illness. A thorough malaria survey was carried out; it revealed 12 species of anophelines:—*A. culicifacies*, *stephensi*, *fluviatilis*, *maculatus*, *superpictus*, *annularis*, *turkhudi*, *splendidus*, *lindesayi*, *d'thali*, *pulcherrimus*, *subpictus*. Dissection of the first 5 species revealed sporozoites in *A. culicifacies* only, 3 out of 1.405 (0.2 per cent.) being positive. No sporozoites were found in 346 *A. fluviatilis* examined though 14 out of 20 examined were found to contain human blood. The anthropophilic index of *A. culicifacies* was 66 per cent., but most of those giving positive results for human blood came from cattle sheds. Transmission is believed to occur from July onwards to October. Details are given of breeding places. Spleen rates range from 2 to 79 per cent. and parasite rates from 3.4 to 23 per cent., *Plasmodium falciparum* predominating.

A control programme with DDT (dosage uncertain) was carried out and data are given of anopheline density, spleen rates and parasite rates before and after treatment, and show material reduction. G. Macdonald

SHUTE, P. G. **Indigenous *P. vivax* Malaria in London believed to have been transmitted by *Anopheles plumbeus*.** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service (directed by Med. Res. Council)*. 1954, Mar., v. 13, 48-51.

Between 1917 and 1952, 566 cases of indigenous malaria occurred in the British Isles. All were *Plasmodium vivax* infections, except one instance

of a *P. falciparum* infection in Liverpool in 1920. Most of the cases (438) occurred in rural areas of Kent and Essex and, although sporozoites have never been found in wild-caught *Anopheles maculipennis* var. *atroparvus* in Britain, there can be no doubt of its rôle as the vector in most if not all these cases of *P. vivax*. It is probable, however, that *A. plumbeus* transmitted the infection of *P. falciparum* in Liverpool. The present note reports that this species was almost certainly responsible for the transmission in the autumn of 1953 of *P. vivax* to a housewife and a boy, unrelated and living in adjacent houses in the Lambeth district of London. It is quite a frequent breeder in rot holes of trees in the squares and streets of London and it readily enters houses to feed on the occupants, who may be unaware of its presence since the bite is painless. This species may well have been the most important vector of indigenous malaria in Britain when much of the country was still heavily forested. Control measures consist of filling rot holes with waste such as clinker or gravel covered with a layer of asphalt or cement. [See also this *Bulletin*, 1954, v. 51, 132.]

D. S. Bertram

GILLIES, M. T. & SHUTE, G. T. **Environmental Influences and the Maxillary Index in *Anopheles gambiae*.** [Correspondence.] *Nature*. 1954, Feb. 27, v. 173, 409-10.

The authors take up the question of biological races of *Anopheles gambiae* in Africa. Others in West Africa [this *Bulletin*, 1952, v. 49, 226; 1953, v. 50, 360] have observed that a maxillary index of 13.5 is associated with anthropophilic and exophilic habits in the adults and breeding preference for temporary pools of low organic content, and that an index of 15 is linked with zoophilism and endophilism and breeding in permanent waters of high organic content. HOLSTEIN [*ibid.*, 1953, v. 50, 360] accepts these two populations as biological races. Using East African material of *A. gambiae* at Muheza, Tanganyika, the authors bred out material in parallel series subject to different conditions of temperature and crowding during larval growth. The egg batches of 69 females were divided into 2 lots and bred up either in crowded conditions at about 21°C., or uncrowded conditions at 32.2°C. The mean maxillary indices obtained were 15.8 ± 0.3 for 226 adults of the latter series, and 14.3 ± 0.3 for 212 adults of the former group.

The 63 parent females had a mean maxillary index of 14.5 ± 0.6 . It is concluded that environmental conditions during larval growth can exert such a marked effect on the maxillary index that this measure cannot be accepted as a criterion specifying biological races of *A. gambiae*. D. S. Bertram

SENIOR-WHITE, R. **Adult Anopheline Behaviour Patterns: a Suggested Classification.** [Correspondence.] *Nature*. 1954, Apr. 17, v. 173, 730.

The use of modern residual insecticides on house walls has led to a more intense study of the feeding and resting habits of adult mosquitoes. The author has drawn up a classification of mosquito behaviour based on these habits. Four categories are thus delineated:—(1) *Endophily*, the habit of remaining within a man-made shelter throughout the whole or a definite part of the gonotrophic cycle. (2) *Exophily*, the habit of spending the greater part of the gonotrophic cycle out of doors. (In both cases food may be sought within or without a man-made structure.) (3) *Endophagy*, the

habit of obtaining the blood meal within a man-made structure. (4) *Erophagy*, the habit of seeking the blood meal out of doors. Examples are given from some of the better known malaria vectors. It was to be expected that some species would fail to conform, such as *Anopheles fluviatilis*, which in the second half of its gonotrophic cycle rests outside until oviposition, and *A. aquasalis* which, in Trinidad, is strictly exophilic, leaving the house immediately after a meal but feeding as much outside as inside.

It is suggested that the classification may be usefully extended to other haematophagous arthropods.

H. S. Leeson

SHARMA, M. I. D. **Malaria Vectors of India. III. *A. fluviatilis* James, 1902.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, Mar., v. 2, No. 2, 46-56, 1 map. [Numerous refs.]

There is nothing original in this paper, in which the author presents a summary of information about *Anopheles fluviatilis* which he has gathered from the published literature.

This anopheline is distributed widely in the Indian sub-continent as shown on an accompanying map; but it is not commonly found below 1,000 feet or over 5,000 feet above sea level. Elsewhere it occurs in Ceylon, Burma, Thailand, Indo-China, Hong Kong, Turkestan, Iraq and the Bahrein Islands.

It breeds in clear water with a moderate current in irrigation channels, rice fields and streams, but in monsoon periods larvae also occur in shallow wells because many of the normal breeding places are washed out. Adult mosquitoes enter houses shortly after dark and feed, but they have also been taken in cowsheds; outdoors they rest near the banks of streams.

The species seems to be anthropophilic in some places and zoophilic in others. This may indicate the existence of 2 biological races. No direct observations are recorded about flight range but other evidence suggests that it may normally be half a mile or less.

This anopheline is an important vector of malaria in foothill country in Madhya Pradesh, Travancore-Cochin, Mysore, Madras, Bombay and in East Central India. Malariological data are given in a table. It seems that malaria is usually hyperendemic where *A. fluviatilis* is the vector.

Some areas seem adequately protected by antilarval measures within 1,000-1,500 feet of human dwellings, but others need protection up to half a mile. In view of the encouraging results obtained in different areas, it is confidently stated that malaria in rural areas due to *A. fluviatilis* can be controlled by indoor spraying of houses with residual insecticides.

H. S. Leeson

BROOKE WORTH, C. & SITARAMAN, N. L. **Studies on the Bionomics of *Anopheles fluviatilis* James, 1902, in Mysore State, India. I. Review of the Literature on Bionomics of *A. fluviatilis*.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 481-90. [24 refs.]

There seems to be sufficient evidence from the review of the literature to conclude that, in Peninsular India at least, different populations of *Anopheles fluviatilis* exhibit different traits.

The authors comment on some of the reports which, although apparently contradictory, they have no reason to suspect are incorrect. It would seem that, in the parts of India where it has been well studied, this mosquito can scarcely be a homogeneous species; but no morphological evidence of the existence of different races has been detected.

This is a piece of a special investigation and the numerous papers here discussed should be consulted in the original by those interested.

H. S. Leeson

FOOTE, R. H. **Pictorial Keys to the Mosquitoes of Medical Importance.**
V. French Indochina. *Mosquito News.* 1954, Mar., v. 14, No. 1, 17-20, 2 figs.

This is the fifth in a series of pictorial keys prepared to help public health workers to identify mosquitoes of medical importance in various parts of the world. Those already published are for the mosquitoes of Korea, Formosa, Malaya and Anglo-Egyptian Sudan.

The adult and larval characters illustrated in this key belong to the following medically important species occurring in French Indo-China:—*Anopheles sundaicus*, *maculatus*, *minimus*, *fluvialis*, *aconitus*, *candidiensis*, *sinensis*, *Aedes aegypti* and *Aedes albopictus*.

About 25 other anophelines are known or are assumed to be present in French Indo-China and approximately 90 other non-anophelines have been recorded from that country.

H. S. Leeson

SHERWOOD JONES, E. & MCGREGOR, I. A. **Pathological Processes in Disease.**
V.—Blood Physiology of Gambian Children infected with *Plasmodium falciparum*. *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 95-101, 6 figs. [12 refs.]

Oxyhaemoglobin dissociation curves were constructed from the blood in 8 cases of severe *P. falciparum* malaria in Gambian infants of 7 months to 4½ years of age. Controls were provided by blood from adult Europeans without malarial history and who received proguanil 100 mgm. daily, and by an adult Gambian and a Gambian child aged 18 months who had had pyrimethamine 10 mgm. weekly since birth. Points on the curves were obtained by standard tonometric methods and the Roughton-Scholander technique. In 6 of the children suffering from *P. falciparum* malaria, the dissociation curves were shifted to the right. The blood plasma was separated anaerobically and the pH measured photometrically. The pH measurements suggested that the shift of the dissociation curve arose from fall in pH and BHCO_3 (fixed base). The authors note that the shift of the curve to the right, if present *in vivo*, would facilitate carriage of oxygen to the tissues.

B. G. Maegraith

JEFFERY, G. M. & EYLES, D. E. **The Duration in the Human Host of Infections with a Panama Strain of *Plasmodium falciparum*.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 219-224.

In a previous communication [this *Bulletin*, 1952, v. 49, 480] EYLES and YOUNG reported that infections with a South Carolina (Santee-Cooper) strain of *Plasmodium falciparum*, if left untreated or if treated inadequately, persisted in the body for an average of 222 days. Three of the infections persisted for more than one year, the longest being 480 days. In the paper under review similar observations are recorded in respect of a strain of *P. falciparum* originating in Panama.

The subjects of the experiment were 39 Negroes suffering from neurosyphilis, inoculated either by mosquito bite or by intravenous injection of

infected blood. In cases where clinical symptoms or high parasitaemia rendered interference necessary, the infection was terminated or reduced to manageable levels by giving small doses of antimalarial drugs. All the patients were under observation throughout the long primary period of continuous parasitaemia, which lasted on an average 115.7 ± 7.5 days, with a range of from 36 to 220 days. These figures did not differ significantly from those recorded for the South Carolina strain.

Twenty-three of the 39 patients were followed up through the period of terminal intermittent parasitaemia. The mean total duration of the infection was 279 ± 19.9 days, with a range of from 114 to 503 days—about 57 days longer than that observed with the South Carolina strain. Four cases persisted for a year or more.

Judged by the mean length of the initial clinical episode, the number of clinical episodes and the total hours of fever, the Panama strain appeared to be more virulent than that from South Carolina. Other criteria suggestive of strain difference were the significantly longer duration of terminal intermittent parasitaemia in the Panama strain, the absence of cross immunity between the 2 strains and differences in gametocyte morphology.

G. Covell

CORCOS, A. Deux cas de paludisme de primo-invasion à symptomatologie urticarienne. [**Two Primary Cases of Malaria With Urticarial Manifestations**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 945-7.

JASWANT SINGH, RAY, A. P., BASU, P. C. & MISRA, B. G. **Effect of Pyrimethamine in Human Malaria. Part I.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 435-40.

Sixty Indian patients suffering from *P. vivax* malaria were treated in the Police and Jail Hospitals, Delhi, with pyrimethamine. Half the patients received a single dose of 25 mgm. (Group A), the remainder 25 mgm. on each of 2 consecutive days (Group B).

Relief of symptoms and clearance of asexual parasites resulted in 59 of the 60 cases. One patient in Group B failed to respond to treatment.

The patients were under observation for 5 to 7 months after treatment. Three of them relapsed during this period, 2 in Group A and 1 in Group B.

Fifty per cent. of those treated gave a history of previous malarial attacks, and in these the clinical response was somewhat more rapid than in the remainder. It is suggested that this might be due to the development of some degree of malarial immunity.

G. Covell

JASWANT SINGH, RAY, A. P., MISRA, B. G. & BASU, P. C. **Effect of Pyrimethamine in Human Malaria (*P. falciparum*). Part II.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 441-7. [13 refs.]

Eighty-four Indian patients suffering from *P. falciparum* malaria received a single dose of 25 mgm. of pyrimethamine on 2 consecutive days. Twenty-two of these were treated at the Police Hospital, Delhi, and the remainder at 2 dispensaries, Maswasi and Gadarpur, in the State of Uttar Pradesh.

All patients became afebrile within 72 hours, with 2 exceptions, and in the majority of cases asexual parasites were no longer seen in the peripheral blood after this period.

The rate of parasite clearance at Maswasi Dispensary was less rapid than at Gadarpur. In the former area pyguanil had been extensively used and

it is suggested that this may have produced some degree of cross-resistance against pyrimethamine. In 2 of the cases treated at Gadarpur clinical symptoms and parasitaemia persisted beyond 96 hours and other anti-malarial drugs had to be administered. No explanation is offered for these 2 failures. The authors, however, believe that considering the small dose of pyrimethamine required for the relief of clinical symptoms and clearance of asexual parasites in most cases, the drug should have a valuable place in the chemotherapy of malaria.

G. Covell

SCHNEIDER, J. Cortisone et paludisme, action nulle dans des essais sur *Pl. berghei*, *Pl. gallinaceum* et *Pl. vivax*. [**Cortisone Without Effect on Various Plasmodial Infections**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1016-23.

Reports by others on the effect of cortisone on plasmodial infections have led the author to publish his results. Thus SCHMIDT and SQUIRES [this *Bulletin*, 1952, v. 49, 237] found that *P. cynomolgi* infection in monkeys was markedly increased in the post-crisis phase of the disease. FINDLAY and HOWARD [*ibid.*, 1952, v. 49, 672] showed that the increase in parasitaemia in mice infected with *P. berghei* was more rapid than in normal hosts and the survival period of the mice was shorter. REDMOND [*ibid.*, 1952, v. 49, 672] described an increase in *P. relictum* infection of pigeons in some cases when the host was treated with cortisone. Somewhat equivocal results were obtained by WURL *et al.* [*ibid.*, 1953, v. 50, 87] on treating *P. vivax* infections in human patients with this substance.

In the present investigation the author has found that no effect whatever was exercised on *P. berghei* infections in mice by daily doses of 10 mgm. per kgm. up to the day of death of the host. In a small series of chickens infected with *P. gallinaceum* and treated with 50 mgm. cortisone per kgm., starting on the day of appearance of parasites and continued up to the 24th day after inoculation, no effect of the drug was apparent.

The effect of cortisone in two human patients infected by blood inoculation with *P. vivax* was studied regarding parasitaemia and liver function. One patient received a total of 1.6 gm. cortisone during the febrile period which was terminated after 12 days. A second patient was given 300 mgm. of the substance daily for 12 days during fever. Apart from a slight fall in blood cholesterol no effect appeared to be exercised by cortisone. Thus the substance was found to be without action in 3 different types of malarial infection.

J. D. Fulton

ARTHUR, J. H. **Malaria and its Control.** *J. Indian Med. Ass.* 1954, Mar., v. 23, No. 6, 255-7.

BRUCE-CHWATT, L. J. **Chemoprophylaxis and Suppression of Malaria in British West Africa.** *Malaria Service Med. Dept. Nigeria. Information Bull. No. 2.* 1954, Mar., 17 mimeographed pp.

This bulletin contains a mass of information concerning the status, mode of action and dosage of the drugs commonly used for the prophylaxis and suppression of malaria among both the indigenous and expatriate populations of West Africa.

The action of the various classes of drugs on the malaria parasite at the different stages of its life cycle are set out in tabular form. A second table shows the action of individual drugs, the rates of absorption and excretion, the effective dosage for non-immune and semi-immune subjects and the

possible toxic side effects. A third table gives the composition, makers' names, formulations and relative prices of the various drugs used for protective purposes in West Africa. The dosage of these drugs recommended for various age groups from infancy upwards is also set out in tabular form.

All this information will be of immense value to those concerned with the treatment and prophylaxis of malaria in West Africa.

A table showing the period before exposure to infection during which the various drugs should be taken is, however, likely to provoke criticism, since the period laid down for proguanil is 2 weeks and that for pyrimethamine 2 weeks if the weekly dose is 50 mgm. and 3 weeks if it is 25 mgm.; whereas it is known that both these drugs are effective when taken immediately before exposure. In the text it is explained that the reason for giving proguanil for 14 days before exposure is to establish a habit of taking the drug regularly. If this view is taken, it presumably applies to all drugs used for prophylaxis, and the need for laying down specific periods for each does not arise. A 14-day period for every drug would cover all contingencies.

Apart from the above minor criticism the abstracter has nothing but praise for this admirable compilation.

G. Covell

CAMPBYN, R. Note au sujet de l'efficacité suppressive du Daraprim comparée avec celle de la Camoquine et de la Nivaquine. [**Suppressive Effect of Pyrimethamine Compared with that of Amodiaquine and Chloroquine**] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 553-61.

The object of the investigation here reported was to compare the efficacy of pyrimethamine (Daraprim), amodiaquine (Camoquin) and chloroquine (Nivaquine) as agents for the suppression of malaria. The subjects treated were drawn from three sources: (1) pupils at the school of Ntambue St. Bernard (aged 5 to 15 years); (ii) pupils at the school of Mikalaye (aged about 16 years); (iii) children attending a milk distribution centre (under 3 years of age).

The parasite indices of the 3 categories were 26.84, 17.5 and 37.75 per cent., respectively. The predominant parasite was *Plasmodium falciparum*. Only subjects with patent parasitaemia were treated. The experiment extended over a period of two months.

The following regimens of drug administration were adopted: (1) 38 children received pyrimethamine in a single weekly dose of 5.75 mgm./kgm.; (2) 12 children received a total dosage of 150 mgm. pyrimethamine distributed once weekly over a period of 6 weeks; (3) 228 children received two doses of the following drugs at 48 hours' interval: 43 amodiaquine at 13.45 mgm./kgm., 64 pyrimethamine at 1.12 mgm./kgm., 51 pyrimethamine at 1.92 mgm./kgm., 70 chloroquine at 22.22 mgm./kgm.; (4) 46 children received two doses of pyrimethamine at 48 hours' interval at 2.76 mgm./kgm.

Groups (1), (2) and (4) were in zones not treated with DDT. Group (3) was in a DDT-treated zone.

It was concluded from the results in Group (3) that pyrimethamine in a dosage of 2 mgm./kgm. was superior to amodiaquine at 13.5 mgm./kgm. or chloroquine at 22 mgm./kgm. as a suppressive. It was also very considerably less expensive. A single dose was fully effective for 45 days and partially effective for 90 days. The authors attribute the long duration of the effect to the fact that the malaria endemicity in this area is moderate only.

G. Covell

CLARK, H. C. **The Suppressive Treatment of Malaria in a Rural Village with Primaquine and Plaquenil.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 250-53.

Ninety-three persons (42 adults and 51 children) of Negro or mestizo race, living in a highly malarious village in Panama, were given suppressive treatment once weekly with primaquine and Plaquenil (hydroxychloroquine) for 20 to 26 weeks. [Plaquenil is a 4-aminoquinoline similar to chloroquine and said to be less toxic (this *Bulletin*, 1952, v. 49, 751; 1954, v. 51, 8).]

The drugs were administered in the form of a combined tablet containing 30 mgm. (base) primaquine and 300 mgm. (base) Plaquenil. The dosage was as under:

| Body weight, lb. | Primaquine, mgm. | Plaquenil, mgm. |
|-------------------|------------------|-----------------|
| 15 or less | 5 | 50 |
| 15 to 45 | 10 | 100 |
| 45 to 90 | 15 | 150 |
| 90 or over | 30 | 300 |

Malaria parasites were found in the blood of 49 out of 92 persons examined before drug administration was begun (36 *P. falciparum*, 9 *P. vivax*, 3 *P. malariae*, 1 mixed *P. falciparum* and *P. vivax*).

Three weeks after the first treatment blood smears of only 6 persons were found positive for malaria parasites (3 *P. falciparum*, 1 *P. vivax*, 2 mixed *P. falciparum* and *P. vivax*). No toxic manifestations were observed.

The results were considered to be good, but no better than would be expected from treatment with chloroquine alone. G. Covell

JÍROVEC, O. Úspěchy rumunského boje s malárií. [**Success of Malaria Control in Rumania**] *Českoslov. Hyg., Epidemiol., Mikrobiol.* Prague. 1953, v. 2, No. 6, 460-68. English summary.

There has been a great increase in the incidence of malaria in Rumania since the end of the war on account of local population movements and the influx of non-immune persons in foreign armies. An extensive epidemic broke out in the Danube delta between 1941 and 1944, an area previously free from malaria, and the maximum incidence for the whole country was attained in 1947, when about a million cases occurred. Energetic counter-measures were introduced; a network of antimalarial stations was set up, and training courses for medical and entomological field workers were given at Jassy university. By treatment with mepacrine, pamaquin and proguanil the number of cases was reduced to 230,000 by 1949.

Further reduction below this level proved impossible until a large-scale attack against the vector with DDT and BHC was carried out, and by 1951 the number of cases had fallen to 30,000. By this time 24 antimalarial stations and 36 support posts were in action. Each antimalarial station consists of a medical director, an entomologist and a histopathologist, with 3 spraying teams of 6 persons each; during the winter the station carries out anthelmintic work. During epidemics the aid of civilian organizations is enlisted for distributing medical supplies. In spring all infants up to 1 year of age are investigated by the thick drop method, and also most children up to the age of 6 years; the investigation of infants is repeated in the autumn in order to detect new cases. Insecticidal measures are begun on May 1st; they cannot be carried out any earlier on account of the local custom of whitewashing all buildings at Easter, which would destroy the residual effect. D. J. Bauer

FEUILLAT, F., PARENT, M., PEETERS, E. M. E. & VINCKE, I. H. Progrès récents dans la lutte anti-malarienne au Katanga. [**Recent Progress in Malaria Control in Katanga**] *Ann. Soc. Belge de Méd Trop.* 1953, Dec. 31, v. 33, No. 6, 621-74, 1 map. [14 refs.]

The province of Katanga is in the south-east of the Belgian Congo bordering on Tanganyika and Rhodesia. In its north-western part it is moderately elevated (500 to 1,000 m.) and perennially warm and humid; towards the south-east the land rises and both humidity and temperature decrease. In Elisabethville the night temperature is below 10°C. for 6 months and always under 15°C. The pattern of malaria, which is carried by *Anopheles gambiae* and *A. funestus*, varies with this change.

VINCKE and PEETERS describe some examples of Government activity in malaria control which started in 1947 and now covers about one-third of the province. DDT is applied usually as a suspension at a dose of 2 gm. per sq. metre once a year. The central zone of major towns is not treated. Applications are made in the periphery and along feeder roads, extending outwards to a distance which is now 20 kilometres. The vector anophelines have disappeared from the central town areas and are greatly reduced in untreated catching stations in the periphery. The use of untreated trap huts demonstrates that the vector species have decreased from 90 per cent. to 3 per cent. of the total catch. Success was less complete in fully rural areas owing to the great number of new houses constructed between applications. Examination of the state of ovaries and stomachs of mosquitoes shows that in this region the 2 main vectors are fully endophilic, never leaving houses till they are prepared to lay eggs, whereas the other species are largely exophilic. Parasite rates have very materially decreased, e.g., in Elisabethville from 43 to 7 per cent., and the infant parasite rate has dropped from 71 per cent. to zero, indicating absolute control of local transmission.

An experiment was made in the total elimination of malaria in 3 small villages by the use of pyrimethamine prophylaxis at a dose of 25 mgm. weekly for 20 weeks. The villages had not previously been treated with DDT though there was a broad ring of control round them. The general parasite rate dropped from 66 per cent. to zero and the sporozoite rate also fell, none of 679 vector species dissected in the last month of prophylaxis being positive. Cessation of prophylaxis was followed by a rapid recrudescence of malaria, the parasite rate being 33 per cent. four months later. Repetition of the experiment among infected migrants into a non-malarious village showed that relapses could not account for the recrudescence.

[Failure to break the chain of transmission could be due to survival of a few infected mosquitoes over the period of the experiment. In a previous paper VINCKE (*Ann. Soc. Belge de Méd. Trop.*, 1946, v. 26, 385) records immediate and delayed sporozoite rates in this region which indicate considerable longevity of *A. gambiae* of which 1 out of 1,000 might well survive over the whole period.]

PARENT records the effect of malaria control by DDT on an industrial population of the Union Minière. Tables give annual figures from the early nineteen-thirties to 1951 of working days lost, hospital days and morbidity for Europeans and Africans and for the infant mortality rate. All of these show material reductions attributable to the programme.

FEUILLAT analyses residual malaria in this latter population. Workers return periodically for long leave to their homes which are not under control. A series examined immediately on return had a parasite rate of 87 per cent.

while a comparison of the rates in children on the mines showed that it was 14.6 per cent. among those who had arrived within the previous 3 months and 0.06 per cent. among others. It is concluded that those returning should receive a welcoming routine treatment with mepacrine or pyrimethamine and that the residual malaria might thus be eliminated.

G. Macdonald

ANANTHASWAMY RAO, B., BHATIA, M. L. & RAMAKRISHNAN, S. P. **Choice of Method of Malaria Control for Rural and Urban Areas.** *Indian J. Malariology*. 1953, Sept., v. 7, No. 3, 273-81, 6 figs. [16 refs.]

The *per caput* cost of malaria control by larval destruction varies inversely with the density of population, while that of control by use of imagocides varies directly. Figures of a number of schemes are given to support this statement in relation to urban communities, reference being made to the gross size rather than to density of the population. The authors consider that for large communities larval control is the more economic, but for small ones imagocidal control is superior. There must be a border line where the two match and it is an urban population of 10,000. However, imagocidal work may have associated advantages such as plague control, making it preferable despite an apparently higher cost. G. Macdonald

RAFI, S. M. **Evaluation of 1st Year of Extensive Spraying Operations in the Punjab during 1952.** *Pakistan J. of Health*. 1954, Jan., v. 3, No. 4, 227-40, 1 map & 6 graphs.

The second year's work of the general scheme of control for the Pakistan Punjab [this *Bulletin*, 1953, v. 50, 1012] is described. The pilot project of 1951 was extended in 1952 to protect 1,511,596 people in 2,206 villages selected as being the most malarious in each District. Transmission by *Anopheles culicifacies* and *A. stephensi* occurs from August to October and 2 rounds of spraying in June and September were intended. The first could not be applied but in September all houses and cattle sheds were treated with 1.5 gm. per square metre of DDT in suspension. Transmission might have begun before this application. Results are recorded in terms of spleen and parasite rates, infant parasite rates, malaria morbidity and entomological findings. The infant parasite rate in sprayed areas was 3.2 per cent. in contrast to 13.8 per cent. in unsprayed areas, and changes in the other indices showed a marked decrease in malaria incidence. G. Macdonald

ADAN, G. L. **Development of Malaria Control in the Philippines.** *J. Philippine Med. Ass.* 1954, Jan., v. 30, No. 1, 29-35. [13 refs.]

The history of malaria in the Philippines and the activities of the pilot control scheme operated with the help of WHO and the US Medical Security Agency are briefly recounted. Reference is made to a single application of 200 mgm. of DDT per square foot preceded and followed by entomological and malariometric observations. The previous infant parasite rate was 32 per cent.; none of 89 infants born after spraying has shown infection, though in a check area 33 per cent. of a comparable group are infected. *Anopheles minimus flavirostris* had been looked on as strongly exophilic and doubt was cast on the possibility of control by residual insecticides. In the test areas, however, it constituted 30 to 50 per cent. of the anophelines resting in houses and has shown itself amenable to control in this way. G. Macdonald

JASWANT SINGH, RAJINDAR PAL & BHATIA, M. L. **Control of Anopheline Vectors of Oriental Region with Residual Insecticides.** *Bull. Nat. Soc. India for Malaria and other Mosquito-Borne Dis.* 1954, Mar., v. 2, No. 2, 31-45. [42 refs.]

Residual insecticides have been used for control of malaria for some 8 years. A review of the results obtained in the oriental region reveals the almost unanimous opinion that they have substantially checked the disease. The authors summarize the published information on 25 oriental anopheline malaria vectors, which have been attacked with residual insecticides. The following table gives an outline of some of the successful results reported:

| Species of <i>Anopheles</i> | Area | Dose of Insecticide (mgm./sq. ft.) | Duration of Effect or Frequency of Application |
|--------------------------------|-------------|---------------------------------------|---|
| | | D = DDT G = γ BHC | |
| <i>aconitus</i> ... | Java | 200 D | 1 year |
| <i>annularis</i> ... | India | 38-50 D | 6-8 weeks |
| <i>culicifacies</i> ... | India | 25-50 D | 6 weeks |
| | | 10 G | 6 weeks |
| | Ceylon | 100-200 D | 6-8 weeks |
| <i>fluvialis</i> ... | India | 50-60 D | 2-5 months |
| <i>hyrcanus</i> ... | Thailand | 200 D | 1 year |
| <i>letifer</i> ... | Malaya | 100 D | 1 month |
| <i>maculatus</i> ... | Malaya | 200 D | 6 months |
| | | 40 G | 6 months |
| <i>mangyanus</i> ... | Philippines | 200 D | 1 year |
| <i>minimus</i> ... | India | 50 D | 5-6 weeks |
| | | 10 G | 5-6 weeks |
| | Thailand | 200 D | 1 year |
| | Thailand | 11 G | 4 months |
| <i>philippinensis</i> ... | Pakistan | 106 D | 9 months |
| <i>punctulatus</i> ... | New Guinea | 100 D | 4 months |
| <i>stephensi</i> ... | India | 50-56 D | 2 months |
| | India | 25-30 D | 10 weeks |
| <i>sundaicus</i> ... | Indonesia | 200 D | 6 months |
| <i>tesselatus</i> ... | Thailand | 200 D | 15 months |
| <i>superpictus</i> ... | Baluchistan | 50 D | 10 weeks |
| | Afghanistan | 112-200 D | 12 weeks |

J. R. Busvine

GABALDON, A. **Possible Effects of Residual Insecticides on the Interruption of Malaria Transmission.** *Riv. di Malariologia.* 1953, Dec., v. 32, Nos. 4/6, 155-71. [48 refs.]

The facts that anopheline mosquitoes carry malaria and that residual insecticides kill mosquitoes, have sometimes led to the uncritical use of these chemicals. This paper makes a careful analysis of the ways in which the insecticides may affect the mosquitoes, strictly in relation to their vector capacity. The simplest effect is the actual reduction of the mosquito population by insecticidal effect. The amount of reduction can be assessed by sampling the unattacked larval population. Examples are quoted in which residual insecticides alone have exterminated certain anophelines; some, in which the population has been reduced and others not appreciably affected. It is pointed out that the emergence of physiological or behaviouristic resistant strains is only likely to occur where the selective lethal action is sufficient to affect the total mosquito population.

Residual insecticides need not necessarily reduce total mosquito populations in order to prevent malaria transmission. They may act as irritant repellents and reduce the numbers entering houses, or the numbers remaining inside and biting. Various factors affecting this repellent effect in different vector species are discussed.

Another way in which residual insecticides can diminish malaria is by reducing the survival rate of mosquitoes which have entered houses and fed on gametocyte carriers. This may have the effect of decreasing the overall age of the mosquito population. It may be noted that where anthropophilic and zoophilic strains of a mosquito exist, the former may be more affected than the latter; similarly, endophilic strains will be reduced more than exophilic strains.

The various factors affecting malaria transmission may be expressed as algebraic symbols, a method used many years ago by Ross and recently revived by MACDONALD [this *Bulletin*, 1952, v. 49, 813; 1953, v. 50, 871]. This type of analysis is helpful in interpreting the action of residual insecticides against malaria as opposed to their purely insecticidal action.

J. R. Busvine

MACDONALD, G. & DAVIDSON, G. **Dose and Cycle of Insecticide Applications in the Control of Malaria.** *Bull. World Health Organization*. Geneva. 1953, v. 9, No. 6, 785-812. [92 refs.]

Current practice in malaria control by contact insecticides is largely empirical as regards dosage and frequency of applications. The present paper attempts to evaluate the position and to derive guidance for future procedure. The bulk of the paper is necessarily concerned with DDT and *gamma* BHC, but some points are noted about dieldrin. First, a detailed statement is set out of the dosages which have been used in many different countries; selection is mainly of those countries in which control has been successful. As a very general statement, it appears that the various dosages of DDT used are equivalent to about 0.33 gm./m² for every month of effective action required. In more detail, effective applications vary from 0.55 gm./m² every 6-8 weeks (India, Ceylon) to doses of about 1 or 2 gm./m² every 3-6 months, or even once a year or more (elsewhere). Analysis of BHC dosages shows that this insecticide is effective generally at 0.11 to 0.12 gm. *gamma* BHC/m² applied every 6 weeks to 3 months; the body of field data is, however, limited for this insecticide. Dieldrin, only recently developed in field work, promises well at dosages of 0.4 gm./m² and 0.25 gm./m².

The realization that contact insecticides can exert a repelling action on resting mosquitoes calls for special endeavours to measure this effect and, particularly, the mortality among such mosquitoes as may be stimulated and leave a treated shelter. The value of the window-trap as a means of tackling this problem is elaborated. Simple expressions are provided for handling the data which are required about living and dead mosquitoes in treated shelters and mosquitoes in window-traps, and their survival. There is, in this connexion, considerable discussion of field and laboratory findings on the influence of the nature of the sprayed surface on the effective duration of insecticides applied in different formulations.

It is re-emphasized that effective malaria control does not require vector elimination, but can follow a certain level of kill of adult mosquitoes, which differs with the conditions to be brought under control. A table summarizes the order of mortality rate which, the authors estimated, should be achieved by an insecticide if it is to be successful. It sets out in a simplified way

suggestions for effective mortality rates for 24 sets of conditions varying with respect to degrees of endophilism, density of the vector, and anthropophilism. The mortality rates given range from 18 per cent. for a vector species of which only 10 per cent. of the mosquitoes bite man, all rest indoors, and initial density is low (1 bite per night) to 88 per cent. for a vector species which is exclusively man-biting, in which endophilism is moderate (a mosquito rests indoors one day in two) and initial density is high (250 bites per night). In general, it is suggested that a 65 per cent. mortality rate of mosquitoes entering a treated shelter should suffice as a normal criterion of efficacy; mild transmission would be controlled with a mortality rate of not more than 50 per cent. and severe transmission would call for an 85 per cent. mortality rate.

As regards selection of formulations of insecticides, it is recommended that wettable powders should be used as they appear most suitable for mud and other absorbent surfaces of tropical dwellings. The specifications laid down by the WHO Expert Committee on Insecticides are strongly advocated.

DDT is particularly liable to give rise to contact repellence effects. The fumigant effects of *gamma* BHC and the particulate effect of dieldrin are characteristics which may prove valuable as compensations for uneven spraying.

In conclusion, it is considered reasonable to put forward these tentative statements:—

- (1) DDT may fail to control very heavy transmission, but at 2 gm./m² applied every 6 months approximately it should, even on absorbent surfaces, be effective for normal conditions of transmission; on non-absorbent surfaces the effective action may last 18 months or more. Low doses of 0.5 gm./m² every 6–8 weeks are known to be effective in certain conditions.
- (2) *Gamma* BHC at 0.2 gm./m² every three months should be adequate for normal conditions (even when applied to absorbent resting surfaces); the interval would be 4 months for mild conditions and only 2 months for severe conditions. A low dosage of 0.1 gm./m² every 6 weeks should be effective for normal conditions, and at a frequency of every 2–4 months for mild transmission.
- (3) Dieldrin promises to be effective in extreme conditions at 0.6 gm./m² every 12 months and for normal and mild conditions by applications every 18 and 24 months, respectively. There may well be need to take account of smoke deposits or other mechanical interruption of contact between insect and insecticide in the case of such long persistence of an insecticide.

D. S. Bertram

JASWANT SINGH, RAY, A. P., MISRA, B. G. & BASU, P. C. **Toxic Manifestations of Repeated Doses of Pyrimethamine in *Rhesus* Monkeys.** *Indian J. Malariology*. 1953, Sept., v. 7, No. 3, 237–40.

The authors have given rhesus monkeys daily doses of 5 to 40 mgm./kgm. pyrimethamine over a period of 1 to 6 weeks and recorded the effects on general health and on the histological appearances in liver and kidney as a result of this treatment. The 2 highest doses caused death in 4 out of 6 animals within a week and 20 mgm./kgm. caused death within 11 days in 3 out of 6 animals, which was preceded by anorexia, loss of weight and convulsions, accompanied by cloudy swelling of liver and kidney. There was slight loss of weight in animals receiving 10 mgm./kgm. doses for 3

weeks, which was more marked after 6 weeks. Degenerative lesions were then present in liver and kidney. In 5 mgm./kgm. doses during 3 to 6 weeks there was no loss of weight or histological damage in the organs.

J. D. Fulton

JASWANT SINGH, NAIR, C. P. & RAY, A. P. **Comparative Study on 4-Aminoquinolines against *P. cynomolgi* in Rhesus Monkeys.** *Indian J. Malariology*. 1953, Sept., v. 7, No. 3, 241-7, 1 chart. [11 refs.]

The effect of the 4-aminoquinolines, chloroquine diphosphate (Winthrop), avlocor (chloroquine diphosphate, ICI), nivaquine (chloroquine sulphate, May & Baker), and amodiaquine (Parke Davis), has been tested in 112 rhesus monkeys infected with *P. cynomolgi*, at least 3 animals being used in a group. After intravenous injection of 5×10^6 parasitized erythrocytes per kgm. of weight, oral treatment during a 7-day period was given on the basis of mgm. of drug per kgm. beginning when the host cells were infected to the extent of 0.1 to 0.2 per cent. A dosage regimen was considered active when complete clearance of parasites from the peripheral blood was effected, as evidenced by examination of 100 fields of a thick blood film. The minimum effective dose (MED) was that which brought about this result on the day following the last dose. The quinine equivalent was defined as MED for quinine divided by the MED for the drug in question. To prove that sterilization had occurred examination of blood films was continued for 4 weeks followed by splenectomy.

The MED of chloroquine, nivaquine, avlocor and amodiaquine were found to be 1.5, 1.5, 1.0 and 3.5 mgm. per kgm., respectively, and their quinine equivalents were 13.3, 13.0, 20.0 and 5.7. Sterilization was effected by 1.5 to 2.5 mgm./kgm. of avlocor but did not occur with 4 mgm./kgm. amodiaquine. One-third of the treated animals were sterilized by 2.0 to 2.5 mgm./kgm. nivaquine and two-thirds of them by the same dosage of chloroquine.

J. D. Fulton

MATILLA, V., APARICIO GARRIDO, J., PRIETO LORENZO, A. & FERNÁNDEZ NAFRIA, A. Contribución al estudio de la inmunidad en el paludismo experimental por "*Plasmodium berghei*". [**Contribution to the Study of Immunity in Experimental Malaria produced by *Plasmodium berghei***] *Med. Colonial*. Madrid. 1954, Jan. 1, v. 23, No. 1, 8-11.

Among some 1,500 white mice experimentally inoculated with *Plasmodium berghei*, some proved to be refractory to the first inoculation of infected blood, but became infected after repeated inoculations, but a group of 10 mice were completely resistant to infection though repeatedly inoculated with large numbers of parasites by different routes (intraperitoneal, intramuscular and intracardial). However, they all became infected after splenectomy. These experiments, therefore, provided evidence of the existence in mice of natural immunity to *P. berghei*.

C. A. Hoare

SCHNEIDER, J. & MONTÉZIN, G. *Pl. berghei* et lait; absence d'action du régime lacté chez la souris. [***Plasmodium berghei* and Milk Diet; Negative Results in the Mouse**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 947-52.

The authors have carried out some experiments on mice infected with *P. berghei* while being fed on a milk diet, but without addition of vitamins

B1 and B6 and calcium pantothenate, as described by MAEGRAITH *et al.* [this *Bulletin*, 1953, v. 50, 384]. The diet was started 3 to 5 days before intraperitoneal inoculation with 25 million parasitized erythrocytes [Maegraith and colleagues gave only 1 to 2 million parasitized erythrocytes to large rats]. Stained blood films from the mice were examined daily till death occurred. Results indicated that the course of infection of mice on a milk diet was practically unaltered [see also RODHAIN, this *Bulletin*, 1954, v. 51, 468]. The divergence in results from those of the original authors is attributed to the different host used and the much larger inoculum.

J. D. Fulton

RAMAKRISHNAN, S. P., SATYA PRAKASH, KRISHNASWAMI, A. K. & CHANAN SINGH. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. XIII. Effect of Glucose, Biotin, Para-Aminobenzoic Acid and Methionine on the Course of Blood-Induced Infection in Starving Albino Rats.** *Indian J. Malariology*. 1953, Sept., v. 7, No. 3, 225-8.

When BALL *et al.* in America successfully cultured *P. knowlesi* [this *Bulletin*, 1945, v. 42, 867] they observed that *p*-aminobenzoic acid (PAB) was essential for growth. In a review of parasitic infections [*ibid.*, 1952, v. 49, 333] McKEE and GEIMAN recorded that rhesus monkeys infected with *P. knowlesi* showed markedly reduced parasitaemia during periods of starvation and that administration of PAB or methionine in particular caused a marked rise in parasite numbers. MAEGRAITH and colleagues [*ibid.*, 1953, v. 50, 384] noted that a milk diet suppressed infection with *P. berghei* in rats which HAWKING [*ibid.*, 1953, v. 50, 1122] found assumed normal character when PAB was added to the milk.

The present senior author reported [*ibid.*, 1954, v. 51, 144] that starvation of albino rats suppressed or eradicated infection with *P. berghei*, and in continuation of this work the effect has been studied of PAB, biotin, methionine or glucose, in doses based on those required for rats, on the course of parasitaemia in starved rats approximately 6 months old infected with the same parasite. The results in general confirmed those obtained with monkeys. Glucose or biotin had no effect on parasitaemia whereas methionine or PAB caused growth of parasites comparable with that in controls. "The growth was appreciably higher in the methionine series."

J. D. Fulton

KRISHNASWAMI, A. K., SATYA PRAKASH, BAMI, H. L. & RAMAKRISHNAN, S. P. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. XIV. Reaction of Blood-Induced Infection in Albino Mice to Proguanil and Dihydrotriazine Metabolites.** *Indian J. Malariology*. 1953, Sept., v. 7, No. 3, 229-35. [18 refs.]

CARRINGTON *et al.* and CROWTHER and LEVI [this *Bulletin*, 1952, v. 49, 362; 1953, v. 50, 485] have isolated and characterized a compound (A) from the urine of rabbit and man, a degradation product of proguanil [paludrine, chlorguanide] and a similar compound from the analogue of proguanil (B) containing 2 chlorine atoms, both of which were apparently more active than the parent substance against *P. gallinaceum* and *P. lophurae*, but according to SCHMIDT *et al.* [*ibid.*, 1952, v. 49, 1025] not against *P. cynomolgi*.

Because of the conflicting results obtained in bird and monkey malaria the present authors have tested these metabolites A and B against *P.*

berghei infections in rats along with proguanil and compared the results with those obtained earlier with quinine, sulphadiazine and Daraprim [pyrimethamine]. The authors concluded that the action of metabolites A and B on *P. berghei* resembled those obtained in avian rather than in monkey malaria. Metabolite A was less active than metabolite B, both being superior to proguanil.

J. D. Fulton

Box, Edith D., GINGRICH, W. D. & CELAYA, Bettie L. **Standardization of a Curative Test with *Plasmodium berghei* in White Mice.** *J. Infect. Dis.* 1954, Jan.-Feb., v. 94, No. 1, 78-83, 1 fig. [21 refs.]

Young white mice were selected by the authors for short-term curative tests on infections with *P. berghei*, because of their great susceptibility, easy handling and the small amount of drug required for treatment. Previous suppressive tests have been described [this *Bulletin*, 1950, v. 47, 324, 325, 1183; 1951, v. 48, 130] and it was then found that established drugs for treatment of human malaria could, in adequate doses, effect cure of blood-induced infections of *P. berghei* in the mouse host, if the treatment was started sufficiently early in the course of infection. The present experiments aimed at determining whether delayed administration of drug would single out those drugs capable of curing *P. vivax* infections in man from others possessing suppressive qualities.

A total of 372 mice of 18 to 28 gm. weight were inoculated intravenously with a standard dose of 1 million parasites. Drug was included in the diet at various intervals after inoculation. When treatment was delayed blood smears were made to ensure that the parasitaemias in the animals of a group were of comparable intensity. As a criterion of cure blood smears were examined over a period of 27 days after treatment ended. Results with drugs such as primaquine, a curative agent in *P. vivax* infections, along with hydroxychloroquine and quinine, which have a marked suppressive effect on the same parasite, confirmed that in general delayed administration gave rise to fewer cures in mice, whereas treatment begun on the day of inoculation effected a high percentage of cures. There was, however, a striking difference between the effects of the curative and the two suppressive drugs: treatment begun 3 and 6 days after inoculation continued to cure most of the mice treated with primaquine, but did not show a similarly high rate of cure in the case of the other two drugs. When treatment with the 8-aminoquinolines, primaquine, pentaquine and pamaquin was carried out on days 3 to 8 inclusive after inoculation their activity was in the order given. Endochin [3-*n*-butyl-2-methyl-4-hydroxy-7 methoxy quinoline], a drug with considerable activity against *P. cathemerium* and which has had only limited trials in human malaria, was curative in about 50 per cent. of mouse infections at high dosage under the above conditions. Of the antibiotics used chlortetracycline (aureomycin) had curative properties in *P. berghei* infections but not oxytetracycline (terramycin), chloramphenicol (chloromycetin) or neomycin at maximum tolerated doses. Daraprim [pyrimethamine] was the most effective drug tested, 5 out of 5 mice being cured with the low drug-diet concentration at 0.001 per cent. When treatment was begun on the day of inoculation a higher percentage of cures resulted whether the drug possessed curative or only suppressive effect against *P. vivax*. The authors conclude that the experiments described are of value in screening drugs for curative effect in *P. vivax* infections.

J. D. Fulton

HEWITT, R. I., WALLACE, W. S., GUMBLE, A., WHITE, E. & WILLIAMS, J. H.
Antimalarial Activity of Dihydrotriazines. *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 225-31. [14 refs.]

Interest in the antimalarial activity of triazines was aroused by previous studies on the metabolic fate of proguanil, in which it was demonstrated that this compound *per se* was inactive *in vitro* against *Plasmodium gallinaceum* and *P. cynomolgi* [this *Bulletin*, 1947, v. 44, 648; 1949, v. 46, 334]. CARRINGTON *et al.* (1951) and SCHMIDT *et al.* (1952) have reported on the activity of the active metabolite of proguanil and of an allied triazine against *P. gallinaceum* and *P. cynomolgi* [this *Bulletin*, 1952, v. 49, 362, 1025].

In the present study data are given regarding the effects of several dihydrotriazines against *P. lophurae* in ducks or *P. berghei* in mice. Several of the compounds tested were more active than quinine, primaquine, proguanil and chloroquine against *P. berghei*. The number tested is as yet too small to allow conclusions to be drawn as to the types most likely to have the most potent activity; up to date the 1-(3,4-dichlorophenyl) compounds appear to be the most promising.

G. Covell

NAMA RAO, R. & GIRI, K. V. **Free Amino Acid Pattern of Blood of Normal and Malarial Chick infected with *P. gallinaceum*.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 411-14, 1 fig.

The authors, in the course of general studies on nitrogen metabolism in chicks infected with *P. gallinaceum*, have investigated the changes in amino acids of blood during the rapid development of the infecting agent. Chickens 2 months old were used and blood was obtained by cardiac puncture before the morning feed. The same hosts were infected with *P. gallinaceum* by blood inoculation and the free amino acids were again determined by paper chromatography. For this purpose each sample of blood was oxalated and to it was added 3 times its volume of 95 per cent. alcohol, and after shaking, the mixture was centrifuged. The supernatant layer was further shaken with 3 volumes of chloroform and the upper layer finally used for chromatographic analysis. Plasma was treated in the same way and erythrocytes freed from plasma by centrifugation were lysed, ground with sand, and freed from protein by alcohol and chloroform. The preparations from normal and parasitized blood were compared; in the presence of controls the chromatograms were developed by running in *n*-butanol-acetic-acid-water and then spraying with ninhydrin. The most significant observation made was that a marked increase in glutamic acid occurred in whole blood and erythrocytes of infected hosts. J. D. Fulton

RAMAKRISHNAN, S. P., RAY, A. P., MENON, M. K. & BHATNAGAR, V. N.
A Note on the Effect of Proguanil on the Sporogony Cycle of *P. gallinaceum* Brumpt, 1935. *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 465-9.

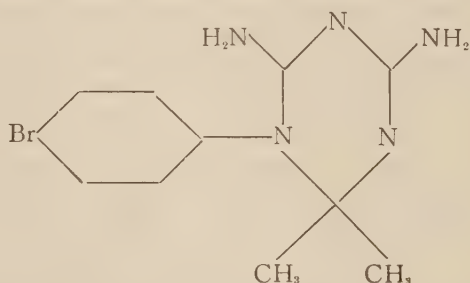
This report deals with the effect of administration to fowls of a single dose of 5 mgm. proguanil [paludrine] per kgm. on the development of *P. gallinaceum* in *Aedes aegypti*. This corresponds, as the authors point out, to a 300 mgm. dose to human patients. In these circumstances it has been shown [this *Bulletin*, 1948, v. 45, 305, 578; 1952, v. 49, 924] that development in the mosquito vector does not take place when it is fed on human patients up to 6 or 8 days after one such dose of the drug. In the present

instance, 2-day-old mosquitoes were fed on 2 infected fowls at short intervals before drug treatment and others at intervals up to 12 days thereafter. After treatment of the first fowl gametocytes were infective to mosquitoes for 3 days, became non-infective from the 4th to the 7th day, and again became infective thereafter. In the second fowl gametocytes were infective for 12 hours following the drug but thereafter were non-infective up to the 7th day, and then became infective once more. It appeared to the authors that the rate of metabolism of paludrine in the 2 fowls differed. [It appeared to the reviewer that the number of fowls used was too small to justify this conclusion.]

J. D. Fulton

BAMI, H. L. **Metabolic Studies with Bromoguanide.** *Indian J. Malariology.* 1953, Sept., v. 7, No. 3, 283-8. [25 refs.]

Bromoguanide, an analogue of paludrine [chlorguanide, proguanil] in which a bromine atom replaces chlorine, appeared to possess antimalarial activity corresponding to that of proguanil in avian and simian infections, but was more toxic and gave rise to more relapses [this *Bulletin*, 1952, v. 49, 122]. An active metabolite of chlorguanide was isolated from the urine of rabbit and man by CARRINGTON *et al.* and CROWTHER and LEVI [this *Bulletin*, 1952, v. 49, 362; 1953, v. 50, 485]. The corresponding product from bromoguanide was obtained by feeding monkeys with 20 mgm. of drug per day for 6 to 10 days and extracting the product from urine. The active substance 2:4-diamino-1-*p*-bromophenyl-1:6-dihydro-6:6-dimethyl-1:3:5-triazine of constitutional formula was obtained as the



picrate in approximately 5 per cent. yield of parent substance administered, and had m.p. 201°C. It proved to be 4 times as active as the corresponding chloro compound and 32 times as active as proguanil against *P. gallinaceum*. Preliminary experiments indicated that the bromo derivative was not as active as proguanil against *P. knowlesi*.

J. D. Fulton

JASWANT SINGH, RAMAKRISHNAN, S. P., KRISHNASWAMI, A. K., SATYA PRAKASH, MAMMEN, M. L. & RAY, A. P. **Drug Resistance of Pre-Erythrocytic Forms of *Plasmodium gallinaceum*** Brumpt, 1935. *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 457-64, 1 chart. [17 refs.]

The development of drug resistance in malaria parasites has now been frequently described [this *Bulletin*, 1921, v. 18, 96; 1933, v. 30, 860; 1935, v. 32, 116; 1942, v. 39, 438; 1947, v. 44, 969, 970; 1948, v. 45, 48, 1066; 1949, v. 46, 119, etc.]. In the present study data are provided in support of the view that a strain of *P. gallinaceum*, blood forms of which were made resistant to Daraprim [pyrimethamine], retained this property in its pre-

erythrocytic forms. When resistance to the drug of at least 15-fold in the blood forms of the parasite had been produced by the usual method of giving subcurative doses of drug, *Aedes aegypti* were fed on the fowls and the infected glands of the mosquitoes were used to infect fresh fowls by intravenous inoculation. A dose of 0.3 mgm. Daraprim per kgm. twice daily for 4 days, which was previously found to act as an efficient prophylactic for the normal strain, failed to do so in the case of the resistant strain and the resulting erythrocytic forms possessed the original resistance undiminished after the mosquito passage. Resistance to paludrine [proguanil] had previously been shown for the same parasite after 5 passages through the mosquito [this *Bulletin*, 1948, v. 45, 1066].

J. D. Fulton

MIELCAREK, J. E. **The Occurrence of *Plasmodium relictum* in the Wood Duck (*Aix sponsa*).** [Research Notes.] *J. Parasitology*. 1954, Apr., v. 40, No. 2, 232.

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

DETHIER, V. G. **Notes on the Biting Response of Tsetse Flies.** *Amer. J. Trop. Med. & Hyg.* 1954, Jan., v. 3, No. 1, 160–71. [38 refs.]

Host selection by insects involves long- and short-range orientation to the host followed by stimuli initiating actual biting and continuous feeding to repletion. Vision, and to a much less extent also smell, are primarily concerned in directing tsetse fly to their hosts but factors stimulating the fly to bite have not been explored. The present paper is a study of this problem undertaken in the Belgian Congo with wild-caught *Glossina palpalis*, *G. morsitans* and *G. brevipalpis* of unknown age but used for tests 24 hours after a blood meal on a guineapig. The experiments were made either with flies in small cages or fixed individually by their wings to wax-tipped sticks. These fixed flies survived better than caged flies and also produced viable pupae; the sexes copulated if removed from the sticks. Although flies vary in details of their biting routine, 3 features were recognized as criteria for assessing the adequacy of a stimulus to promote feeding, *viz.*, salivation, probing and piercing.

In establishing control tests, it was decided to use white, hard, non-glossy paper as a platform for the feet of the control fly. Few pierced or salivated on this substratum and, at most, nearly a quarter of the flies (*G. palpalis*) probed its surface. Thus, simple tarsal contact with a chemically neutral surface appeared, therefore, to be a slight stimulus to feeding. Testing flies on paper treated with water, various sugars, sodium chloride, urea, several amino acids and human sweat elicited no evidence of a further stimulus acting through tarsal chemoreceptors. Nor was there response to odour from cloth previously worn by guineapig or by man. But heat (a paper-covered tube of water at a surface heat of 38°C., a human finger or a guineapig) gave increased probing and piercing. At a general environmental

temperature of 26°C., the warm tube surface required to be at 34°C. to give evidence of an increased stimulus to feed; above this temperature an inhibiting influence set in. The optimum temperature is presumably between these two limits. As regards salivation, this apparently takes place, as further experiments showed, to both favourable and unfavourable stimuli—even to 70°C. and in tests on repellents. [Having observed salivation on warmed microscope slides the author draws attention to the possibilities of using this method for detecting flies infective with trypanosomes, but appears to be unaware that this principle has long been known, with the use of coverslips, since the work of BRUCE *et al.* (this *Bulletin*, 1913, v. 2, 583) and developed, by means of slides, by BURTT (this *Bulletin*, 1946, v. 43, 1121).]

Observations on the influence of the stage of digestion of a previous meal confirm the field work of JACKSON [*ibid.*, 1949, v. 46, 1014]. There is little tendency to feed for the 24 hours after a meal and, again, after 90 hours the responses fall sharply: between these times, which corresponded to hunger stages III to IV defined by Jackson on abdominal appearance, the maximum responses to stimuli are obtained.

Amputation of antennae and palps, or both, demonstrated that heat appreciation appears to be centred in thermoreceptors in the antennae. The tarsi, although clearly sensitive to temperature by being withdrawn from heated surfaces, do not play a part in thermoreception inducing feeding.

The following substances were tested for repellence on a finger and on treated guineapigs: 622 (6 pts. dimethyl phthalate, 2 pts. indalone, 2 pts. 2 ethyl hexanediol-1, 3), 1 M HCl, 1 M acetic acid, 5 M NaCl, pentanol and absolute methanol. The responses of the flies indicated that the repellency of these substances depended not on contact with the tarsi but on a short range olfactory appreciation located in the antennae. If, as in the fixed flies, the repellence could not be expressed by the fly withdrawing from the treated surface, biting responses were initiated by the stimulus of heat.

In general, parallel experiments with free-flying caged flies always elicited responses consistent with the results obtained with fixed flies and no paradoxical differences were observed in the behaviour of the different species of tsetse fly.

D. S. Bertram

WILLETT, K. C. **The Laboratory Maintenance of *Glossina*. I. Parasitology.** 1953, May, v. 43, Nos. 1/2, 110-30, 7 figs.

This paper describes experiments on the breeding of tsetse fly under laboratory conditions at Shinyanga, Tanganyika. Stable temperatures about 26°C. in the laboratory could be maintained only when accompanied by low humidities, and the flies were kept for the major series of experiments in cages over water in open-sided thatched huts. Survival rates then improved from a mean of 22.21 days to 34.55, or more, days. Ten flies were kept in a cage, these being of the small type used in the Geigy technique [this *Bulletin*, 1949, v. 46, 122]. Parallel experiments were made with, in one series, sheep as hosts and, in the other series, guineapigs. Blood meals were offered daily. Although most of the work was done with *Glossina swynnertoni*, some data are given for observations on the breeding of *G. morsitans*, *G. austeni* and *G. pallidipes*. The experiments were conducted on a statistical design providing reliable comparisons of the data obtained.

The paper is well illustrated with tables and diagrams which are fully considered and discussed in the text. Some of the principal results may be briefly noted below under species.

G. swynnertoni: Starting with 30 wild-caught females in each case, the series fed on guineapig produced 53 males and 32 females in the third generation but numbers then declined while the sheep series increased slowly to 64 males and 52 females in the fourth generation and, although this is not tabulated, to better numbers up to the seventh generation. Mean length of life for the sheep series was about 80 days—about twice the survival of the flies maintained on guineapig. Usually males survived only three-quarters of the female span. The longest possible life was 191 days for a male, and 174 for a female fed on sheep. The sheep-fed flies produced better yields of pupae than those fed on guineapig, with a maximum record of 4.45 pupae per fly from the fourth generation parents of the sheep-fed series. Intervals between larvae ranged from about 15 to 25 days, on the whole twice the expected interval of about 10 days. All but 2 of 258 females finally examined had been inseminated and it is concluded that the long inter-larval period implies a 50 per cent. abortion rate. Observation shows that some flies aborted more than others. Pupal weights were recorded and only those over 22 mgm. were accepted as satisfactory progeny and kept for maintaining the population. Again, the guineapig series shows, after initial success, a decline in mean weights after the third generation whereas the sheep series has maintained a fairly stable value of 24 to 25 mgm. per pupa. Emergence rates also were better in the sheep series. In general, the guineapig series shows much less prospect of perpetuity than the sheep-fed series.

Pupal periods ranged from a mean of 26.3 days to 33.75 days. A simple device for handling pupae with a minimum of damage is illustrated. An atmosphere of 90 per cent. relative humidity was found best for pupae; this restricted weight loss.

G. morsitans: Whether maintained on sheep or on guineapig, initial populations of 18–19 wild-caught females declined to unisexual generations of 2–4 flies by the fourth and last generation. This was due to something other than failures in insemination.

G. pallidipes: This species was unsuccessful in breeding in the laboratory. Guineapig was particularly unrewarding, the 30 original females producing only 23 pupae as opposed to 78 pupae from the 30 initial females fed on sheep. But the principal limiting factor was failure in insemination. Despite numerous variations in technique only 3 females were mated; 2 died in a day or two and the third produced a single pupa of only 27.3 mgm., the only fly of the third generation. It lived for 173 days. For this species, the inter-larval period was nearly 54 days, indicating an abortion rate in the initial parents of about 75 per cent.

G. austeni: Limited observations suggest that this species may prove extremely amenable to laboratory maintenance, providing both long survival in good numbers (7 out of 10 flies surviving for a mean period of about 126 days in one cage), and a rapid and high reproductive rate (certainly 5, possibly 7, pupae per female at an inter-larval period of about 17 days). Pupal weight distribution has the pattern of a normal curve, suggesting that under-sized pupae are much less frequent than with the other species. If work still in progress confirms these early findings and this species is as susceptible as others to infection with trypanosomes (for which there is some evidence) it would appear to be a most valuable vector for laboratory investigations on trypanosomiasis.

D. S. Bertram

WILSON, S. G. **A Preliminary Study of the *Glossina pallidipes* Austen Population at Makueni, Kenya.** *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 141-61, 17 figs.

The Makueni fly-belt of Kenya lies between Lat. $1^{\circ}30'$ and $2^{\circ}00'$, and between Long. $37^{\circ}30'$ and $38^{\circ}00'$ E. and is between 2,600 feet and 4,000 feet above sea level. There are two dry periods in the year, one during January and February, when it is hot and bright, and one from June to September when it is cooler and cloudy. At these times the non-riverine bushland and thickets are leafless. The usual small game are present as well as rhinoceros, elephant and buffalo; other animals are seen occasionally and the common tsetse fly is *Glossina pallidipes*.

Routine fly patrols have collected flies from January 1949 onwards and they have shown that there is a regular seasonal increase in numbers in February and March and less regular increases during June-July and October-November. Maximum captures occurred when day temperatures were highest.

Increases recorded by river patrols were attributed to an influx of tsetse from elsewhere and a study of riverine and non-riverine breeding sites supported the view that *Glossina pallidipes* preferred riverine areas during hot periods. It was also observed that the rise in fly populations along patrol routes near rivers was never (with one exception) so great or so regular in the cooler August-September dry season as in the hotter January-February dry season. The exceptional occasion was in 1949 when it was unusually hot in June-October and tsetse moved not only to the shaded riverine area but also into the increased *Combretum-Dalbergia* association in the settled areas. Though the origin of the flies in the settled areas was doubtful it is suggested, though not confirmed, that at one place their presence may have been due to movement of fly upstream.

Heavy rainfall during May to September in 1951 corresponded with decreased catches along certain patrols compared with the previous year when the rainfall was normal, but these decreased catches did not coincide with any invasion of the settled areas. It seemed that the flies tended to remain in the open bushland where the heavier rainfall had produced more shade than usual. However, at another place where the bushland was drier there was a riverine migration even in a wet year. *H. S. Leeson*

PARSONS, B. T. **Field Observations on a Breeding Place of *Glossina pallidipes* Austen in Kenya.** *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 163-74, 2 figs. & 1 diagram.

"A breeding-place of *Glossina pallidipes* Aust., in evergreen shrubs of *Craibia* sp. on the Kiangine river, Makueni, Kenya, was studied by means of hand-searching for puparia in conjunction with records of rainfall and temperature. A fly-patrol was also operated. The country away from the river was thorn-scrub, with *Acacia* and *Commiphora* trees predominating.

"Three sites, each of 200 sq. yards, divided into 50 squares, were marked out, and two of them were searched monthly and the third quarterly.

"Site 'A' was searched nearly every month between April 1949 and June 1952, and full puparia were nearly always found. Numbers varied very widely; and it was noted that few could be found in rainy seasons during the months of November to January and April to May, though 1950 was an abnormal year. A consistently large increase in numbers was observed in February, the hottest and driest month, and a rather less

marked increase towards the end of the long dry season in September and October. Large numbers of full puparia also tended to coincide with times of low average minimum temperature.

"The numbers of flies caught on the fly-patrol did not appear to bear any close relation to the numbers of full puparia discovered.

"Testing for efficiency of searching by means of marked puparia showed that about 40 per cent. of puparia were recovered, so that results must be taken as relative.

"Collections which were kept for hatching showed a widely varying parasite percentage (*Thyridanthrax* sp.), a sex-ratio of approximate equality, and a hatching-time for *G. pallidipes* of 35 to 40 days.

"Vegetation analysis showed that squares most favoured for larviposition contained a two-storeyed structure of *Craibia* shrubs.

"Site 'B' was searched monthly between February 1950 and June 1952, and the full puparia were marked and replaced. The trend of numbers followed that observed in site 'A', but generally in smaller totals, perhaps due to the more open nature of the site. An interesting case of correlation between shade and situation of puparia was noticed in October 1951. Recoveries of the marked puparia were good; and they confirmed that the time for duration of full puparia in the site was between one and two months.

"Site 'C' was only searched eight times, at quarterly intervals. Very large numbers of empty puparia were removed at the first searches, but there was no significant difference between the totals of full puparia from this site and from site 'A'. It was concluded that the more frequent disturbance of the soil in the latter did not have an unfavourable effect on breeding.

"Flooding of the sites in April 1951 caused a decrease in the fly-population; and a concentration of puparia under flood-débris in the following June and July was noted.

"It is suggested that the existence of large tracts of *Combretum exaltatum* shrubs with *Sansevieria*, as an alternative type of breeding-place for *G. pallidipes*, has a marked effect on the use of the evergreen *Craibia* thickets."

TRINCÃO, C., FRANCO, A., GOUVEIA, E. & PARREIRA, F. O tempo da protrombina e a prova da hipoprotrombinémia provocada na doença do sono. [**Prothrombin Time and the "Provoked Hypoprotrombinaemia Test" in Sleeping Sickness**] *Anais Inst. Med. Trop.* Lisbon. 1953. Mar., v. 10, No. 1, 11-14, 1 graph.

The English summary appended to the paper is as follows:—

"The writers observed in some cases of sleeping sickness a prothrombin time below the normal levels which the intravenous injection of 0.01 gr. of vitamin K does not correct. After administration of 600 mgr. of Tromexan the prothrombin time returned to the initial levels within normal time."

TORREALBA, J. F. Investigaciones sobre Enfermedad de Chagas en Zaraza (Estado Guárico - Venezuela). Otras Notas Científicas. Recopilación. [**Studies in Chagas's Disease in Zaraza, Guárico State, Venezuela, and other Collected Papers**] Fascículo IV. 1953. 332 pp., 33 figs. & 3 maps. [Numerous refs.] Caracas: Tipografía Garrido.

It is not easy to assess the value of this book, or, as Professor Torrealba describes it, fasciculus of which this is the 4th of a series. Previous issues

have been reviewed in this *Bulletin* [1947, v. 44, 187; 1952, v. 49, 380]. The main object of the publication is, states the author in his preface, the collection of papers published in periodicals and reviews so that readers may keep up to date with medical matters in their district.

The work opens with 2 papers on Chagas's disease in Guárico State; the first by Torrealba himself on 14 fresh cases, 13 proved by xenodiagnosis and one by examination of a thick drop; 12 were chronic and 2 acute; 7 of the patients were members of one family. In addition, 2 cases, one chronic and one acute, of infection by *T. rangeli* are noted. Brief notes are given of the myocarditis present and the electrocardiograms and the differential leucocyte counts of 13 of them. The second paper, by Torrealba and his colleagues, summarizes 20 new cases seen in Guárico State since the previous report, with photographs showing Romana's sign. Of the 5 other papers 2 are by Torrealba alone, 2 by him as part author and 1 by Dr. Pablo J. ANDUZE. Article 3 gives an account, mainly by tables, of the geographical distribution of Triatomidae in Guárico State, according to municipalities, suburbs, and villages, stating those in which *Rhodnius prolixus*, *Eutritoma maculata*, *Eratyrus cuspidatus* and *Panstrongylus geniculatus* were seen. The first was fairly common, the second much less so, the third was seen only once in the village of Tucupido in the Sabana Grande de Orituco and the fourth 3 times in El Tigre, El Sombrero municipality, Tablerito, Laraza municipality and in Santa Maria, respectively.

To sum up: these first 3 papers record 20 cases of Chagas's disease, a clinical account of one patient in the Caracas Children's Hospital, the histological changes in the myocardium of one patient from Zaraza, new cases of *T. rangeli* infection and the distribution of Triatomidae in the State. The contribution of TORREALBA and VÁZQUEZ is a short one mentioning the extra-domestic foci of Triatomid vectors in the States of Guárico and Cojedes. Next follows an article on the medical geography of the Zaraza district and 12 short chapters, giving the population, birth- and death-rates, meteorological returns, rainfall, etc., a list of the diseases recorded, the prevalence of intestinal parasites; *Enterobius* is very common, hookworm (*Necator americanus*) 40.5 per cent. of 200 specimens examined; in some regions the infection rate is as high as 92 per cent.; *Trichuris* 27 per cent., *Ascaris* 21 per cent.; other diseases are classified under systems or organs affected. Malaria infection is chiefly by *P. falciparum*, quinine being used in treatment, plasmoquine and mepacrine being kept for special cases. Eighteen species of snakes are listed; spiders, scorpions and centipedes are mentioned but not named, except the "large and dangerous *Araña Mona*", as they have not been properly studied. Finally, there is a chapter on the medicinal plants of the district, 78 being mentioned with their botanical names, and the article ends with a copious bibliography and a series of photographs. Dr. Anduze's article gives an account of the medical geography of the Ribas and Zaraza districts of the State of Guárico with short notes on the demography, topography, social life and naming the chief diseases of man and animals, the insect vectors of disease, notably Argasid ticks, *Argas persicus*, *Ornithodoros*, *Amblyomma cayennense*, *Rhipicephalus*, *Tunga penetrans* and *Phlebotomus*. To complete this section lists are given of trees of economic or ornamental interest, plants, especially the medicinal, the arthropods, flora, fauna and birds.

The last 100 pages are occupied by an account (or, rather, reproduction) by Torrealba of the various notices, circulars, orders and conferences in Venezuela during the past 30 years, interesting locally as informative of the progress of health measures in the country.

H. Harold Scott

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

CROWTHER, S., FULTON, J. D. & JOYNER, L. P. **The Metabolism of *Leishmania donovani* in Culture.** *Biochem. J.* 1954, Feb., v. 56, No. 2, 182-5, 1 fig. [27 refs.]

In this investigation on the overall metabolism of *L. donovani*, the organism was grown in large numbers in a medium previously described [this *Bulletin*, 1950, v. 47, 529] which could be used for primary aseptic culture of infected organs such as liver or spleen at 25°C. It contained salts, glucose, rabbit serum, liver extract, peptone and haemoglobin in solution, and at the start had a pH of approximately 8. In order to follow the production of the various acid substances a large number of flasks were used, each of which received the same inoculum of infective material. The required number of culture and control flasks was taken at selected intervals up to a maximum period of 14 days after inoculation, to estimate the quantities of metabolic products present. For this purpose the organisms were removed by centrifugation and after deproteinization of the medium several litres of material were distilled *in vacuo* at a temperature below 40°C., and the distillate was neutralized by dilute NaOH. The residue was exhaustively extracted with ether and the substances present were separated on a Hyflo Super-cel column. Keto acids were estimated separately.

The chief products of metabolism were found to be carbon dioxide, acetic, pyruvic and succinic acid. Acetic acid was the only volatile acid formed in significant amounts. Lactic acid may also have been formed as an intermediate product but did not accumulate in the culture medium. The presence of acetoacetate in control and experimental flasks was demonstrated by colorimetric and chromatographic methods on paper. Traces of acetone and citric acid were also detected. The main carbohydrate source for the organisms was glucose, and oxygen consumption and other metabolic activities depended on its presence in the medium.

J. D. Fulton

DEY, N. C. & KAUR, B. K. **A Case of Oriental Sore in Assam.** *Indian Med. Gaz.* 1953, Apr., v. 88, No. 4, 201, 1 fig. on pl.

The authors report a case of oriental sore from the Lakhimpur district of Assam, which they claim is the first indigenous case occurring in their province. The patient was a Marwari girl aged 12 who was reported not to have been outside the province since she was 4 years of age.

The lesion, which was on the side of her nose, started as a red spot 3 months previously and had extended to become an ulcer 3/8 inch in diameter surrounded by a raised red oedematous area and covered by a scab. A smear from the lesion showed *Leishmania*. [This disease has hitherto not been recognized as being endemic in Assam. In view of the fact that the medical profession there is already familiar with one form of leishmaniasis, it is unlikely that an endemic focus of another form would have been overlooked in Assam. It would be a pity if this report of a single case were allowed to confuse the literature on the subject. There are several possibilities that should be considered. The girl was a Marwari; there must be relatively few such in Assam. She was born in a country where oriental sore is endemic. It was stated that she had not been out of Assam for 8 years, but this may not have been true. Alternatively, the condition

may have been latent during this period; this is a long time but latency for 2 or 3 years is not uncommon. She had naturally been in contact with others more recently arrived from an endemic area; it was stated that none was suffering from oriental sore, but again this may not have been true. Finally, as no steps were taken to determine that the organism was *Leishmania tropica* and not *Leishmania donovani*, the lesion might have been an atypical example of post-kala-azar dermal leishmaniasis; this, however, is most improbable since the senior author who is an experienced dermatologist (known personally by the reviewer) will be familiar with this condition, and the photograph shows a typical oriental sore of the chronic, late-ulcerating (recidiva) type.]

L. E. Napier

MORZYCKI, J. **Adaptation of the Strain *Leishmania tropica* to the Simple Culture Media.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1953, v. 5, 228. [Also fuller version in Polish 224-6 & in Russian 226-8.]

"We succeeded in adapting the strain of *Leishmania tropica* to the ordinary meat and yeast broth by gradual decreasing of the quantity of blood and glucose in the culture medium. The adaptation took place after 43 passages made every 14 days. The adapted strain *Leishmania* is developing on the simple culture media somewhat more rapidly than on the special media rich in nourishing components. The adapted strain shows the greater length and the smaller transverse size of the micro-organisms. The strain obtained is applicable for didactic purposes and for the pharmacological researches."

ECHANDI, C. A. Estudios sobre la sensibilidad cutánea en la leishmaniosis tegumentaria en Costa Rica. [**On the Montenegro Reaction in Cutaneous Leishmaniasis in Costa Rica**] *Rev. Biología Trop.* San José, Costa Rica. 1953, Dec., v. 1, No. 2, 173-95. [35 refs.] English summary.

The author tested the Montenegro reaction in 158 persons suffering from cutaneous leishmaniasis ulceration in various stages. He used 2 antigens, *Leishmania brasiliensis* and *L. enriettii* and graded the results thus: induration less than 0.5 cm. as negative; 0.5-0.9 cm. +; 1.0-1.9 cm. ++; 2 cm. or more ++++. If there was vesiculation or a zone of necrosis at the end of 48 hours, the result was considered +++++. A series of tables indicate the results. The cutaneous sensitivity is said to be equal for both antigens, but the tables show considerable differences of degree. The reaction ++ was found in 77 (48.7 per cent.) with *L. brasiliensis*, but only in 41 (25.9 per cent.) with *L. enriettii*; + was 59 (37.3) and 103 (65.2) respectively; +++ was nearly the same in each, 6 and 4 respectively, but +++++ was found in 15 (9.6 per cent.) with *L. brasiliensis* and only 8 (5.1) with *L. enriettii*. Among 13 suffering from dermatoses other than leishmanial none was positive and among 131 persons living in areas endemic of the disease, but not showing any signs, 3 were found to give a positive response.

The author quotes records of others who have reported negative results of the Montenegro reaction in Chagas's disease, in tuberculosis and in leprosy. In 71 patients clinically diagnosed as leishmaniasis, sensitivity was 96 per cent., but certain virus diseases—he mentions measles, chickenpox, mumps and yellow fever—may cause false negative reactions. The positive reaction in cutaneous leishmaniasis begins to show early, within a month and possibly

as early as 8 days, and those with mucocutaneous lesions react more strongly than those with cutaneous lesions only, but the reaction, once positive, appears to persist for life.

H. Harold Scott

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

GIROUD, P., CECCALDI, J. & ROGÉR, F. Comportement sérologique vis-à-vis des rickettsioses de l'homme et de quelques animaux domestiques au Moyen-Congo. [**Responses of Man and Various Domestic Animals in the Middle Congo to Serological Tests for Rickettsial Diseases**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 62-3.

The authors state briefly and in general terms the findings in a number of serological tests with certain rickettsial antigens. The tests were chiefly of the micro-agglutination type but in some cases complement-fixation reactions were carried out. The results are regarded as confirming the previous evidence of the frequent occurrence of boutonneuse fever, murine typhus and Q fever in the Middle Congo region.

All the 12 African and 1 European employees in the Brazzaville abattoirs gave positive reactions with boutonneuse-typhus antigen, and 4 of the 13 persons reacted with murine typhus antigen at titres of 1 in 80 to 1 in 320. "Analogous" results were obtained with epidemic typhus antigen but it was thought that these may have been explained by the close antigenic relationship that exists between *Rickettsia prowazeki* and the rickettsiae of the other two diseases. Two of the persons, including the European, gave positive reactions with *Rickettsia burneti* at titres which are not stated but are said to suggest that infection had been comparatively recent.

In tests of 3 European patients in the Brazzaville Hospital positive reactions with boutonneuse antigen occurred in every case and one of the patients also reacted with Q fever antigen.

In tests of 36 animals comprising cattle, goats and sheep from a farm 17 kilometres distant from Brazzaville there were 5 positive reactions with *R. burneti*, 13 with boutonneuse antigen and 6 with murine antigen. The highest proportion of positive reactions was among goats, but no figures are given.

John W. D. Megaw

ANIGSTEIN, L., WHITNEY, Dorothy M. & BARNES, W. Elimination of Radiocinated Antirickettsial Homologous Gamma Globulin from Non-Immune and Specifically Immunized Rabbits. *Texas Reports on Biol. & Med.* 1954, v. 12, No. 1, 3-20, 5 figs. [20 refs.]

FULLER, H. S. **Human Body Lice. IV. Direct Serial Passage of Typhus Rickettsiae by Oral Infection.** *Proc. Soc. Exper. Biol. & Med.* 1954, Jan., v. 85, No. 1, 151-3. [18 refs.]

The author describes a simple method of serial passage of rickettsiae through body lice. Insects of the 3rd instar were starved for 18-24 hours and then allowed to feed on infected material by the chick-skin membrane method [see this *Bulletin*, 1950, v. 47, 127]. The infected lice were then

fed daily on rabbits and in due course they provided infected material for the oral feeding of the next group of lice.

Rickettsia mooseri was maintained for 19 consecutive passages over a period of 95 days. *R. prowazeki* was passaged 5 times within 79 days. No changes in the virulence or other properties of the strains were detected.

Attempts to maintain infected lice on a diet of human serum given by the chick-skin membrane method gave unsatisfactory results.

John W. D. Megaw

FULLER, H. S. **Studies of Human Body Lice, *Pediculus humanus corporis*.**

III. Initial Dosage and Ambient Temperature as Factors influencing the Course of Infection with *Rickettsia prowazeki*. *Amer. J. Hyg.* 1954, Mar., v. 59, No. 2, 140-49. [14 refs.]

The experiments described in this paper are interesting, though the author points out that in themselves they have little relation to what happens in natural conditions during an epidemic of louse-borne typhus.

Groups of human body lice were infected by the chick-skin membrane method referred to in the previous paper [see above]; various strengths of infective material were given, the lice were kept at uniform temperatures, and were fed daily on normal rabbits.

The following tables give a general impression of the results observed. For full details of the experiments the paper must be consulted.

I. Survival in days of standard lice (groups of 20 to 30) kept at various temperatures:

| Temperature | (a) After infection with 1,300 ID50 <i>Rickettsia prowazeki</i> | | | (b) Uninfected |
|-------------|---|---------|---------|----------------|
| | Mean | Minimum | Maximum | Mean |
| 25.6°C. | 15.4 | 2.5 | 26.2 | 26.3 |
| 31.9°C. | 7.4 | 2.0 | 12.5 | 12.5 |
| 35.8°C. | 2.4 | 1.0 | 4.5 | 2.4 |

II. Effect of infecting dosage of *R. prowazeki* on the longevity of lice incubated at 34.5°C. (groups of 18 to 50):

| Doses (ID50) | Longevity in days | | |
|-----------------|-------------------|---------|---------|
| | Mean | Minimum | Maximum |
| 1,300 | 3.2 | 1.0 | 4.5 |
| 13 | 5.1 | 3.5 | 7.0 |
| 1.3 | 5.4 | 2.5 | 7.5 |
| Uninfected | 4.96 | 2.8 | 9.3 |

John W. D. Megaw

BENOIST, F., GIROUD, P. & HÉRAUD, G. Typhus murin récurrent. [Relapsing Murine Typhus] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1954, Nos. 5/6, 158-61, 1 chart.

The authors describe a case of fever in which the clinical features are consistent with the diagnosis of murine typhus, and the rickettsia-agglutination, tested 30 days after the onset, was positive at a titre of 1 in 320 with murine-typhus antigen. With the antigens of epidemic typhus, boutonneuse fever and Q fever the reactions were completely negative. The patient was an African labourer resident in Paris. He said that 2 years previously he

had suffered in North Africa from a severe attack of typhus fever lasting 34 days and that at the same time his mother had died of this disease. In view of the circumstance that no case of murine typhus had been reported in Paris for "a number of years" the question arose whether the present attack might not have been a late relapsing form of murine typhus corresponding to the Brill type of epidemic typhus.

In the discussion of the authors' paper Dr. M. Worms suggested that the evidence pointed to the occurrence of a previous attack of epidemic typhus in Africa and a later independent attack of murine typhus in Paris.

John W. D. Megaw

STEWART, P. D. **Scrub Typhus in Hong Kong.** *J. Roy. Army Med. Corps.* 1954, Apr., v. 100, No. 2, 121-6. [10 refs.]

Scrub typhus had been recognized by various medical men in Hong Kong for a number of years but this is the first published record of cases in which there is a statement of the evidence on which the diagnosis was based. In 1949 there were 5 military cases in which a rising-titre reaction with *Proteus* OXK occurred; the maximum titres ranged from 1 in 250 to 1 in 1,000 and the rise was fourfold or more in each case.

In 1950-51 there were 10 military cases in which the maximum titres were from 1 in 160 to 1 in 10,240, and except for the case with the highest titre significant rises or falls of titre occurred in every case. The Weil-Felix reaction with *Pr. OX19* and *Pr. OX2* never reached a significant titre.

All but one of the 15 cases occurred during the hot rainy season, May to October, and this was the period during which AUDY [this *Bulletin*, 1951, v. 48, 546] found *Trombicula deliensis* prevalent in Hong Kong among rats.

John W. D. Megaw

TRAUB, R., JOHNSON, Phyllis T., MIESSE, Marie L. & ELBEL, R. E. **Isolation of *Rickettsia tsutsugamushi* from Rodents from Thailand.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 356-9.

The authors describe the first isolation of *Rickettsia tsutsugamushi* that has been reported from Thailand. The isolation resulted from a systematic survey in which *Trombicula deliensis* was found to be prevalent among the rodents of a certain locality. Rats and ground squirrels were sent to Washington, DC, from this area and were examined by the authors who inoculated white mice with suspensions of their livers and spleens. A strain of *R. tsutsugamushi* was recovered from a pool of 3 *Bandicota* (sp.). The other 12 bandicoots examined were not found infected. Another strain was recovered from a pool of 2 *Rattus rattus thai*. Among 6 other rats of this species no infection was found, and the 6 *Menetes berdmorei* examined were also free from infection. Mice inoculated with 50-400 LD50 of each strain survived when treated with chloramphenicol and later resisted challenge with 25-250 LD50 of the Karp strain of *R. tsutsugamushi*. Mice immune to the Karp strain resisted challenge with 3,000 LD50 of the Thai strains, which conformed in all other respects with the known strains of the organism.

John W. D. Megaw

FULLER, H. S. **Studies of Rickettsialpox. III. Life Cycle of the Mite Vector, *Allodermanyssus sanguineus*.** *Amer. J. Hyg.* 1954, Mar., v. 59, No. 2, 236-9. [12 refs.]

The life-cycle of *Allodermanyssus sanguineus*, vector of rickettsialpox, consists of the following stages: egg, larva, protonymph, deuteronymph, and

the adult male and female. At 23–24°C. and 80 per cent. relative humidity hatching occurred in 4–5 days. The larva did not feed and the larval stage lasted for 3 days. Protonymphs fed within 1 or 2 days of emergence and could engorge (on suckling white mice) in 1 hour. They moulted 3 or 4 days later to the deuteronymph which, unlike that of *Bdellonyssus bacoti*, is a blood-sucking stage. The deuteronymph stage lasted 6–10 days. Both nymphal stages were quiescent for the 2 days prior to moulting. The adults were capable of feeding several times, the female laying eggs 2–5 days after engorgement. Development from egg to adult required 17–23 days. Protonymphs survived 10 days unfed, but mortality was high after 1 week. One female survived for 9 weeks after capture from a house mouse, during which time it had fed at least twice. Survival limits for males and deuteronymphs were not determined. An attempt to establish a colony of this mite on a house mouse in an artificial nest failed, but only 10 mites were available to start the infestation.

D. S. Bertram

AMERICAN GEOGRAPHICAL SOC. **World Distribution of Rickettsial Diseases.**

2. Tick-Borne and Mite-Borne Forms. *Atlas of Diseases.* Plate 11 (5 coloured maps on folding pl.). [Numerous refs.] 1954. New York 32: Broadway at 156th Street. [\$1.25 folded; \$1.50 flat.]

This is the 11th of an excellent series of large plates which are being produced by the Department of Medical Geography of the American Geographical Society. The preceding 10th sheet showed the known distribution of louse-borne and flea-borne typhus; the present one deals with tick-borne and mite-borne typhus fevers, Q fever and rickettsialpox. The reviewer is naturally strongly biased in favour of the system of nomenclature and classification in terms of the vectors which has been adopted for the fevers of the typhus group. It would indeed be difficult to imagine a satisfactory display of the distribution of these fevers if any of the other systems had been chosen.

In this sheet there are 5 separate maps of (1) North America, (2) South America, (3) Europe and Asia, (4) Africa, and (5) Australasia. All the maps are on the scale of 1 in 30,000,000. The division of the world into regions has made it possible to adopt a system of projection familiar to the ordinary viewer who must have been disconcerted by the projection system adopted in the preceding plate in which the whole surface of the globe was shown in a single continuous map [see this *Bulletin*, 1954, v. 51, 363]. The whole of the back of the sheet is occupied by a detailed bibliography of the sources of information from which the maps have been compiled. Every medical library and museum ought to subscribe to this valuable series of maps which show in vivid colours what is known of the world distribution of various infectious diseases.

John W. D. Megaw

TAYLOR, R. M., MOUNT, R. A., HOOGSTRAAL, H. & DRESSLER, H. R. **The Presence of *Coxiella burneti* (Q Fever) in Egypt.** *J. Egyptian Pub. Health Ass.* 1952, v. 27, No. 4, 123–8. [20 refs.]

“The recovery of *C. burneti* from *Hyalomma dromedarii* obtained from camels and from *Hyalomma excavatum* obtained from Sudanese bulls at the Cairo Municipal Abattoir is reported.

“As far as the authors are aware this is the first report of the identification of *C. burneti*, the cause of Q fever in Egypt.”

URBACH, H. Erfahrungen und Ergebnisse mit der Komplementbindungsreaktion auf Q-Fieber an Menschen- und Rinderseren. [**Experiments with the Complement-Fixation Test for Q Fever in Human Beings and Cattle**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1954, Mar., v. 111, No. 1, 62-7.

In complement-fixation tests of the sera of 774 cattle from various regions there were 22 suspicious reactions but none was definitely positive. Closer examination of the suspected sera showed that the reactions were probably non-specific because many of the sera concerned gave positive reactions with the Wassermann test.

Sera of 219 slaughter-house workers from the same regions gave uniformly negative reactions.

In tests of 108 Wassermann-positive human sera there were only 2 suspicious reactions for Q fever, and among 111 Wassermann-negative sera only one gave a suspicious reaction. It was concluded that in man the complement-fixation reaction for Q fever is highly specific, even in persons who give a positive Wassermann reaction.

In anticomplementary sera the disturbing effects were largely eliminated in 35 out of 45 cases by preliminary treatment of the sera with kaolin: the technique of the process is described.

John W. D. Megaw

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

CALVO, A. E. & GALINDO V., P. Epidemiologia de la fiebre amarilla en Panamá (1948-1952). [**Epidemiology of Yellow Fever in Panamá (1948-1952)**] *Archivos Med. Panameños.* 1954, Jan.-Feb.-Mar., v. 3, No. 1, 48-58.

In November 1948, a member of a group of agricultural workers was admitted to Santo Tomás Hospital as a case of malarial encephalitis, but proved to be suffering from yellow fever; between 11th November and 28th December 4 more were admitted. All 5, males between 16 and 42 years of age, were engaged in agricultural work in a wood 10-25 miles east of the town of Panamá. The diagnosis was confirmed in all 5 at autopsy. It is almost certain that there were other cases, because many fell sick with similar symptoms and because 8 of 10 patients admitted from the same district as the former, with "fever of undetermined origin" were shown to have, subsequently, positive sera against yellow fever, although they had not been vaccinated against that infection.

Between December 1948 and August 1949, no more cases were reported; this is the dry season in Panamá and sylvatic mosquitoes were much fewer. Then, on 5th August 1949, a lad of 19 years who had been working for 4 months as an agricultural labourer in a district of Colón, some 30 miles north-west of Panamá, was admitted to hospital with yellow fever and died 2 days later. On the 19th a second youth of 20 years was admitted and he too died 2 days later of yellow fever. He had been working at Limón on the eastern bank of Gatun Lake, about 35 miles north-west of Panamá. A campaign of vaccination against the disease was started in 1949 and intensified in 1950; then, on 12th April 1951, a man who had been vaccinated

3 days before was admitted into Almirante Hospital and died next day of yellow fever. In June another case occurred and the virus was isolated from his serum—said to be the first case in which this has been done in the Isthmus. This patient recovered and left hospital 10 days after admission.

In October 1951, a sporadic outbreak occurred on the Pacific Coast of Costa Rica and there were 2 more cases there in February 1952 within the limits of the Republic of Panamá. Lastly, in July 1952, there were "about 100 deaths from an undetermined fever" among the population of Alto Bayano and at the source of the river Chucunaque, between the provinces of Panamá and Darién, where protective vaccination had not been carried out, owing to geographical difficulties and the resistance of the people.

The authors refer to the now well-known epizootic in monkeys in this region, in which about 60 per cent. of monkeys of the genus *Alouatta* have been affected; the genus *Cebus* has not appreciably been involved.

A campaign to deal with the outbreaks comprises, as usual, serological investigations among the inhabitants, entomological studies, viscerotomy tests, immunization of susceptibles and eradication of *Aedes aegypti*, but the local vectors are *Haemagogus spegazzinii falco* and *Aedes leucocelaenus*, and it is proposed to review periodically the immunization of those living near or working in the woods.

H. Harold Scott

MIRANDA, G. Comportamiento de algunas pruebas de ictericia en la fiebre amarilla. [**On Certain Laboratory Tests of the Jaundice in Yellow Fever**] *Rev. Biología Trop.* San José, Costa Rica. 1953, Dec., v. 1, No. 2, 147-71, 10 graphs. English summary.

Yellow fever is not a common disease in Costa Rica and Panamá at the present day, but in view of possible outbreaks it is well to determine the value of laboratory tests in suspicious cases. The author has had under his observation 170 such cases. Among 144 of these there were 24 ending fatally and in these the clinical diagnosis of yellow fever was confirmed. The following were the tests carried out: bilirubin estimation, total cholesterol, serum protein estimation and the cephalin-cholesterol, thymol, colloidal red, and colloidal gold tests. In 14 of the 144, daily tests were not possible and the findings are, therefore, based on the remaining 130. The tests were usually begun on the 3rd day of disease, when jaundice began to appear; it increased during the next 3 days and then, as a rule, started to lessen and disappeared in about 8 days, or a fortnight from the start of the illness.

During the first 3 days, the bilirubinaemia, direct and total, remained normal. On the 5th and 6th days the total was usually above the normal limit, while the direct tended to fall and at the acme of the jaundice, round about the 6th day, the direct increased until it accounted for 59-60 per cent. of the total. This is characteristic of all hepatic cellular jaundice. The highest levels were seen in those who died; the lower levels are, therefore, of good prognosis. The serum cholesterol fell (Allen, Pelkan and Bloor's method was used) in those who died, to the lowest normal limit and even lower still in the 2nd week of disease; in those who survived there was a rise beginning on the 6th day and a return to normal at the end of a fortnight. Serum protein remained normal (6.98 gm. per cent.) for the first 3 days, then began to fall by the 5th and 6th days to 6.62 gm. and thereafter, in those destined to die, the fall was rapid, to 4.8 gm. by the 9th day. In those who recovered it never fell below 6.0 gm. per cent. and after the 11th day returned rapidly to normal. The flocculation tests may be considered together; during the first week they veered towards a negative; they then

became positive, but the results were somewhat irregular and were useless as regards any prognostic value. The results of the above tests are shown very clearly in graphs.

H. Harold Scott

RABIES

HOTTE, G. A. & PEERS, J. H. **Studies on the Removal of the Encephalitogenic Factor from Rabies Vaccine.** *J. Immunology.* 1954, Mar., v. 72, No. 3, 236-42. [15 refs.]

Although there is no proof that the encephalitogenic factor which causes allergic encephalitis in animals and the factor responsible for post-vaccinal paralysis in man are identical, the two conditions are so similar that it was considered worth while to try and eliminate from rabies vaccine the encephalitogenic factor in brain tissue.

Hottle and Peers have shown that by suspending the brain tissue of rabbits in distilled water, at 5 gm./100 ml. of suspension and centrifuging at a relative centrifugal force of 1000 *G* for 1 hour, the major portion of the encephalitogenic factor is sedimented: the supernatant fluid contains the mouse-protective antigen in undiminished potency. It was found essential to use distilled water, for as little as 0.05 M sodium chloride was sufficient to change the physical character of the 1000 *G* sediment and to precipitate a considerable amount of the protective antigen. This amount of saline did not interfere with the removal of the encephalitogenic factor by centrifugation.

G. W. A. Dick

BANIČ, S. Über die schädliche Wirkung des Phenols auf die antirabische Vakzine. [**On the Deleterious Effect of Phenol upon Antirabies Vaccine**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1953, Dec. 22, v. 110, No. 6, 502-5.

Of 20 mice immunized with rabies vaccine containing 1 per cent. phenol, 9 died of rabies, 3 from other causes; of 40 mice immunized with rabies vaccine [kind not stated] without phenol, 14 died of rabies, 3 from other causes. The author therefore concludes that 1 per cent. phenol damages the antigenic power of rabies vaccine, and recommends that the concentration of phenol in rabies vaccine be reduced to 0.5 per cent. [The final concentration of phenol in Semple-type vaccine usually is 0.5 per cent. No reference is made to other work on rabies vaccines, except to one earlier paper of the author's.]

A second experiment, in which 3 groups of 20 mice immunized with daily doses of 0.3, 0.2 and 0.1 ml. of 1 per cent. phenolized vaccine respectively all had about the same resistance to rabies [deaths from rabies following challenge were 13, 13 and 12 respectively], is interpreted as showing that these doses of phenol do not damage the antibody-forming mechanism of the mouse.

E. T. C. Spooner

VEERARAGHAVAN, N., BALASUBRAMANIAN, A. & SUBRAHMANYAN, T. P. **Action of Receptor-Destroying Enzyme of *V. cholerae* in Rabies.** *Indian J. Med. Res.* 1954, Jan., v. 42, No. 1, 1-3.

"These results would indicate that the receptor-destroying enzyme of *V. cholerae* given subcutaneously, intraperitoneally or intravenously is of no value in preventing the onset of rabies in animals challenged with the virus intracerebrally or subcutaneously."

IVÁNOVICS, G., ABRAHÁM, E. & KOCH, A. Über die Züchtung des Virus der Aujeszky'schen Krankheit in Hühnerembryonen-Gewebskulturen und seine Pathogenität für Hühner. [The Cultivation of the Virus of Aujeszky's Disease in Chick Embryo Tissue Culture and Its Pathogenicity for Chicks] *Zent. f. Bakt. I. Abt. Orig.* 1954, Apr., v. 161, No. 1, 3-10. [13 refs.]

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

POLLITZER, R. [M.D.] **Plague.** *World Health Organization: Monograph Series No. 22.* 698 pp., 79 figs. (3 coloured). 1954. Geneva: Palais des Nations. (Sales agent for U.K., H.M. Stationery Office.) [65s.; \$10.00; Sw.fr. 40.—.]

The publication of this excellent monograph is an important event. Till its appearance the most recent book on plague in the English language has been the manual by WU LIEN-TEH and three other workers including the present author [this *Bulletin*, 1936, v. 33, 726]. That book, besides being out of date, had the drawback of having been written primarily for Chinese workers.

The text of the present volume, except for revision and the inclusion of the most recent contributions to the literature, has already appeared as a series of 10 studies published in the *Bulletin of the World Health Organization* between November 1951, and September 1953. These studies have already been reviewed in this *Bulletin* and now in the more attractive form of a handsome volume they obviously justify the high praise given to them separately. Each study is complete in itself and has its own bibliography. The scope of the work is shown by the following list of the chapters: (1) history and present distribution of plague; (2) the plague bacillus; (3) problems in immunology; (4) pathology; (5) methods of laboratory diagnosis; (6) hosts of the infection; (7) insect vectors; (8) clinical aspects; (9) epidemiology; (10) control and prevention. There are two annexes, one containing in tabular form lists of known and suspected reservoirs and vectors of plague. The most important table shows the zoological status and scientific names of 185 wild rodents and 15 lagomorphs proved to be naturally infected or strongly incriminated because of positive findings in their ectoparasites. In this, as in the other tables, references are given to the workers who have discovered infection and to the areas concerned. The other tables give lists of animals presumed to be naturally infected and of animals found susceptible to experimental infection. The last table deals in the same way with the 84 wild-rodent fleas found naturally infected or proved to be susceptible to infection.

The second annex is a guide to the identification of the 9 fleas which are "predominant in medical literature"; it is by F. G. A. M. SMIT, custodian of the Rothschild Collection of Siphonaptera at Tring. It is illustrated by 40 beautifully clear original drawings showing the diagnostic features of the fleas.

The total number of references to the literature in the different sections of the book is more than 2,000, a figure which indicates that the policy of the author has been to give the source of every important statement. When dealing with controversial questions he has stated the conflicting views with conspicuous fairness and has avoided dogmatic *ex cathedra*

pronouncements. At the same time he has not hesitated to express definite views on the right methods of dealing with the practical problems which confront workers engaged in the treatment and prevention of the disease.

The different sections of the book are coordinated by the index which has about 1,000 entries; a few of these, however, are not very helpful; for example a reader who wishes to look up some special point in connexion with *Xenopsylla cheopis* will find only a list of 95 numbers of the pages in which there are references to the insect.

The author acknowledges the valuable help he has received from experts in England, South Africa, the U.S.A. and India. The greatest credit is obviously due to WHO whose enlightened enterprise made it possible to produce the book, and workers on plague all over the world would greatly appreciate the publication from time to time of small supplementary volumes dealing with recent advances in knowledge of the disease. The book is being translated into French by Dr. G. GIRARD who has exceptionally high qualifications for undertaking this task.

John W. D. Megaw

SANTER, M. & AJL, S. **Metabolic Reactions of *Pasteurella pestis*.**

I. Terminal Oxidation. *J. Bacteriology*. 1954, Apr., v. 67, No. 4, 379-86, 3 figs. [21 refs.]

"Resting cells of *Pasteurella pestis* exhibit a high endogenous metabolism. This high endogenous respiration can be correlated with the large intracellular pools of Krebs' cycle intermediates. Using labelled cells it has been possible to show, however, that endogenous respiration does not interfere with the oxidation of exogenous substrates.

"Whole, nonproliferating cells oxidize all members of the tricarboxylic acid cycle. The fraction of the acids attacked is oxidized to CO₂ and water.

"Acetate oxidation proceeds via the tricarboxylic acid cycle. This conclusion was reached by studying the variation due to time in specific C¹⁴-content of the intracellular intermediates during oxidation of labelled acetate.

"The organism contains isocitric dehydrogenase and aconitase which when combined convert citrate to α -ketoglutarate. This reaction is reversible."

LEVINE, H. B., WEIMBERG, R., DOWLING, J. H., EVENSON, Margery, ROCKENMACHER, M. & WOLOCHOW, H. **The Oxidative Dissimilation of Serine by *Pasteurella pestis*.** *J. Bacteriology*. 1954, Mar., v. 67, No. 3, 369-76, 5 figs. [26 refs.]

"Serine was oxidized rapidly at pH 6.8 by resting cells of *Pasteurella pestis*, strain A-1122. The oxidation was specific for the L-isomer of serine. The oxidation of serine to completion was obtained in the presence of 2,4-dinitrophenol. Pyruvate and acetate were identified as intermediary compounds of serine metabolism. Accumulation of acetate was favored by pre-treatment of the cells with glycine. The complete oxidation of these compounds to carbon dioxide was demonstrated."

BURROWS, T. W. & BACON, G. A. **The Basis of Virulence in *Pasteurella pestis*: Attempts to induce Mutation from Avirulence to Virulence.** *Brit. J. Exper. Path.* 1954, Apr., v. 35, No. 2, 129-33.

The editorial Survey of this paper is as follows. [The authors] "in view of the fact that *Pasteurella pestis* grows best at 28° and not at 37°.

speculate on the possibility that avirulent strains represent reversion to primitive ancestors which were parasites of arthropods. They have attempted to produce virulent mutants from an avirulent strain, and may have succeeded once in 237 tests."

The authors state that apart from a claim that virulent strains show significantly greater catalase action than do avirulent strains [this *Bulletin*, 1949, v. 46, 825] no investigator has established a criterion based on any *in vitro* property by which virulent and avirulent strains can be differentiated with certainty.

The classical avirulent Tjiwidej strain described by OTTEN was used in the experiments. It was repeatedly purified by growth from a single cell and was then cultivated subject to X-ray or ultraviolet radiation. The test was by intraperitoneal injection into groups of 20-50 mice of doses of 1×10^7 for each mouse. After observation of the mice for at least 7 days any animals that died were closely examined and when positive cultures of *P. pestis* were obtained these were injected in similar doses into groups of 20 mice. Failure to kill test mice was taken as showing the absence of virulent mutants. Among 237 trials only one virulent strain was recovered. The question remained whether this could have been an accidental contamination with a virulent culture; this was regarded as a very remote possibility because no virulent strain was found among 40 individual colonies obtained by plating the final suspension used for infection of the 50 mice in the experiment which yielded the virulent strain. This observation suggested that the proportion of virulent to avirulent strains in the culture must have been less than 1 in 40, and from other experiments described in the paper it seemed probable that the proportion of virulent cells in the suspension was in the range of 1 in 1,000 to 1 in 10,000.

The problem of the occurrence of rare virulent strains as mutants of avirulent strains is discussed from various points of view.

John W. D. Megaw

BURROWS, T. W. & BACON, G. A. **The Basis of Virulence in *Pasteurella pestis*: Comparative Behaviour of Virulent and Avirulent Strains *in vivo*.** *Brit. J. Exper. Path.* 1954, Apr., v. 35, No. 2, 134-43, 5 figs. [19 refs.]

In view of the failure of various workers to disclose the mechanism which determines virulence in *Pasteurella pestis* the authors decided to compare the behaviour of virulent and avirulent strains *in vivo* with special reference to the degree of resistance shown to phagocytosis of the organisms by polymorphonuclear cells in the peritoneal cavity of living mice. The leucocytes were first mobilized by injecting wheat starch intraperitoneally into the mice at a suitable interval before injecting the bacilli under test. At first the rate of phagocytosis of virulent and avirulent strains was the same, but soon the virulent strains showed a progressively increasing resistance to phagocytosis, and by the end of 5 hours they almost entirely ceased to be ingested and appeared to be multiplying rapidly in the exudate; the avirulent organisms continued to be ingested and the number remaining free in the exudate was reduced to a low level. It was noticed that the bacilli ingested, whether virulent or avirulent, became swollen, stained poorly, and eventually ceased to be recognizable as plague organisms.

Virulent bacilli recovered from mice after 5 hours' contact with the peritoneal exudate *in vivo* were injected intraperitoneally into normal mice; they were not ingested by the leucocytes just after introduction as had happened with the original virulent cultures; freeing them from peritoneal

exudate by centrifuging and resuspending them in buffer fluid made no difference to their resistance to phagocytosis which appeared to have resulted from an alteration in their structure or from the absence of a time lag in the production of antiopsonic or antiphagocytic factors on transfer to normal mice. It was found, however, that washing the virulent cells 6 times in phosphate buffer deprived them of their power to resist phagocytosis.

When mice were given a second dose of virulent agar-grown cells 4 hours after the injection of large doses of virulent organisms no marked phagocytosis occurred; this suggests that impairment of the phagocytic efficiency of the leucocytes had occurred.

The authors justifiably claim that the above and the other experiments recorded in the paper have brought useful facts to light but they also point out that the methods of investigation bear little relationship to the natural pathogenesis of plague.

The paper calls for, and well deserves, careful study by every worker interested in the important problem of changes of virulence among bacteria.

John W. D. Megaw

LANDY, M. & TRAPANI, R. J. **A Hemagglutination Test for Plague Antibody with Purified Capsular Antigen of *Pasteurella pestis*.** *Amer. J. Hyg.* 1954, Mar., v. 59, No. 2, 150-56.

In this highly technical paper the authors describe experiments which show that an antigen consisting of the highly purified capsular ("envelope") protein of *Pasteurella pestis* did not sensitize normal sheep erythrocytes in such a way as to render them agglutinable by plague antisera. Preliminary treatment of the erythrocytes with a weak solution of tannic acid (1 in 20,000) rendered them capable of adsorbing the antigen and so of making them readily agglutinable by antiplague serum. The haemagglutination test based on this principle was found to be 20 to 50 times more sensitive than the complement-fixation test and to be equally specific. It was also much more sensitive than the bacterial agglutination test.

Comparative trials of the above tests were made with sera of immunized rabbits and of plague patients. Some of the human sera gave high-titre reactions (in one case at 1 in 640) with the special haemagglutination test, even with sera that gave negative reactions with the other two tests.

The results reported suggest that positive reactions are likely to be obtained with the special test at an earlier stage than with the usual tests.

John W. D. Megaw

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

SHAFFER, J. G. & BALSAM, T. **Ability of *Endamoeba histolytica* to Phagocytose Red Blood Cells.** *Proc. Soc. Exper. Biol. & Med.* 1954, Jan., v. 85, No. 1, 21-4, 3 figs.

The object of the present experiments was to study the phagocytosis of red cells by different strains of *E. histolytica* and find out how this property

was influenced by antiserum or drugs. What is termed the phagocytic index was first determined by addition of a definite quantity of defibrinated rabbit blood to 48-hour cultures of *E. histolytica* showing heavy growth. Gentle shaking effected mixing and on sealing with petrolatum incubation of the mixture was continued at 37°C. for 15 minutes. The supernatant fluid was removed and distilled water added which hydrolysed all red cells which had not been engulfed by amoebae and left those engulfed intact. The phagocytic index was obtained by counting the average number of red cells engulfed by 25 amoebae. The effect on phagocytosis of aureomycin, oxytetracycline, ilotycin, fumagillin and emetine at different concentrations in a balanced salt solution was studied on incubation for different periods up to 20 hours. At the end of this time the rabbit blood was added and the phagocytic index determined as described along with that in controls. Those amoebic trophozoites which did not phagocytose red blood cells were not included in the results, this irregularity in phagocytic activity being more apparent in older cultures.

The action of anti-amoebic serum from rabbits at definite concentrations was tested. The effect of absorbing the rabbit serum with suspensions of bacteria accompanying *E. histolytica* during its preparation was also investigated.

The authors justifiably consider that their experiments may offer a means of studying certain characters of *E. histolytica* as well as the mechanism of action of drugs and antiserum. Though further experimentation is necessary, it has been shown that all the drugs tested impaired the ability of the parasite to phagocytose red blood cells over a certain range of concentration and time. Immune serum had a comparable effect. J. D. Fulton

MANDOUL, R., PESTRE, A. & VANLANDE, J. Biologie et pouvoir pathogène de *Giardia intestinalis*. Thérapeutique spécifique de la lambliose par la Quinacrine. [**Biology and Pathogenicity of *Giardia intestinalis*. Specific Treatment of Giardiasis by Mepacrine**] *Algérie Méd.* 1953, Sept., v. 57, No. 9, 802-12. [22 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SEN, S., BASU, B. C. & BANERJEE, D. **Streptomycin and Terramycin in the Treatment of Rat-Bite Fever due to *Spirillum minus*.** *Indian Med. Gaz.* 1954, Jan., v. 89, No. 1, 3-9, 4 charts.

The authors, in Calcutta, treated 12 cases of rat-bite fever with intramuscular injections of streptomycin and 2 cases with oxytetracycline. In all, *Spirillum minus* was identified either directly from the site of the bite or by animal inoculation. The criterion of cure was absence of fever for 1 to 2 weeks, together with negative animal inoculation tests.

The results are shown in 2 tables and 4 representative cases are recorded in detail.

Streptomycin was used for the treatment of 10 adults and 2 children. In the former 0.5 gm. was given twice daily for 1 to 4 days: the children were given respectively 0.25 gm. and 0.1 gm. twice daily, for 3 days in the first case and for 1 day in the second. The temperature fell in 1 to 4 days in every case and no relapses were reported. The minimum curative dose for an adult was thus 0.5 gm. twice on a single day.

The first of the patients who received oxytetracycline had 2 capsules [amount not stated] every 6 hours for one day and 1 capsule every 6 hours

the next day. The temperature became normal after one day and there were no relapses reported. The second patient had 250 mgm. intravenously on each of two successive days: the temperature became normal on the second day and no relapses were reported.

The authors add that in a few clinically typical cases, spontaneous recovery occurred.

H. J. O'D. Burke-Gaffney

YAWS AND OTHER TREPONEMATOSES

MONTEL, M. L. R. A propos d'une monographie publiée par l'O.M.S. et intitulée: "Atlas of Framboesia". [Observations on the WHO Monograph "Atlas of Framboesia"] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 105-7.

The short monograph referred to [this *Bulletin*, 1951, v. 48, 1117] was intended to clarify and simplify the question of yaws but, in the author's opinion, has made it more complex and confused. He stresses the incompleteness in it of the list of authorities referred to, the limited geographical scope of the material of the monograph and the absence of illustrations of juxta-articular nodules and goundou, radiographs of bone lesions and photomicrographs of the histopathology of lesions. It is not progress or simplification to replace the older nomenclature of 3 stages (primary, secondary and tertiary) by one of 6 categories.

The author next discusses the unsatisfactory nomenclature used in the monograph and suggests that the nomenclature should use a strictly dermatological vocabulary and that popular expressions such as mother yaws, etc., should be banished. He suggests the following terms: *chancre pianique*, primary lesions of inoculation or framboesial chancre; the flat secondary lesions such as erythematous lesions and circinate, furfuraceous and desquamating papular lesions would be [secondary] pianides or framboesides; the generalized secondary papillomata would be pianomas or framboesiomias; the tertiary lesions would be ulcerating or nodular [tertiary] pianides or framboesides.

He also proposes the following terms in order of clinical evolution: (1) *chancre pianique* or framboesial chancre; (2) secondary yaws comprising the *roséole pianique* or the framboesial roseola, the secondary circinate, papular, agminate [grouped], acuminate [pointed], follicular and furfuraceous pianides [or framboesides] and the varieties of pianomas or framboesiomias; (3) secundo-tertiary lesions comprising the encroachment of tertiary or secondary lesions. [These, he states, include the palmar and plantar framboesides and the bone lesions of the fingers]; (4) tertiary framboesial lesions comprising ulcerative, gummatous, pigmentary skin and bone lesions.

He refers to a number of his papers which have been reviewed in this *Bulletin* over the years.

[Montel has been interested in yaws for nearly 50 years and has closely studied many aspects of it. The reviewer feels that further study might possibly resolve the secundo-tertiary lesions largely into secondary and tertiary lesions. Montel's writings on yaws always merit careful consideration.]

C. J. Hackett

SEPULVEDA, G., JR. & IBARRA, L. M. **The Effectiveness of Penicillin in the Treatment of Yaws (Primary and Secondary).** (Preliminary Report.) *J. Philippine Med. Ass.* 1953, Dec., v. 29, No. 12, 727-33.

This paper starts with a brief description of the course of yaws. The palmar and plantar lesions of the secondary stage, the authors say, "are sometimes characterized by dry, eroded lesions and fissuring similar to the keratosis palmaris and plantaris of the late stage". Bone lesions are only mentioned in the tertiary stage in which goundou is placed. The most frequent tertiary lesion is said to be keratoderma palmare and plantare. A latent or asymptomatic seropositive stage is noted. Penicillin in oil and beeswax is reported to have been used in the Philippines in 1946.

In 1950, 56 dark-field and serologically positive early yaws cases were treated with penicillin. Most of the patients were between 3 and 14 years of age. All had secondary lesions and half had primary lesions as well. Most of the primary lesions (21 of 28) were on the lower limb. Thirty patients were given 3 injections and 26 four injections each of 300,000 units of penicillin in oil with aluminium monostearate (PAM) at intervals of 2-3 days; 16 and 10 of these were observed for 3-15 months.

The clinical results were dramatic. There was one relapse at 5 months in a patient who had had a primary lesion and had received 3 injections. In only 3 of the 26 patients observed did the standard Kahn become negative but in all except one there was a reduction in titre.

[The authors do not refer to any paper on the treatment of yaws with penicillin more recent than 1949.]

C. J. Hackett

LOUGHLIN, E. H., JOSEPH, Aurele A. & DUVALIER, F. **Oxytetracycline Intramuscular in the Treatment of Yaws (Pian).** *Antibiotics & Chemotherapy.* New York. 1954, Feb., v. 4, No. 2, 155-64, 11 figs.

Two of the present authors have already reported [see this *Bulletin*, 1952, v. 49, 53] that oxytetracycline (Terramycin) in daily doses of 1-2 gm. by mouth for 5 days caused rapid healing of early yaws and quickly rendered them non-infectious. They also claimed that in the treatment of late yaws ulceration the drug by mouth and applied to the lesion was more effective than any remedy they had previously used.

Starting in December 1951, 120 West Indians in Haiti with yaws were treated with oxytetracycline intramuscularly. About two-thirds were males; the ages of the whole group ranged from 5 months to 69 years. Five patients had primary lesions only, 45 had primary and secondary skin lesions, 30 had framboesiomias only, 9 framboesiomias and plantar lesions, 6 ulcerous plantar lesions only, 9 non-ulcerous plantar lesions and 4 both types of plantar lesions, making 108 with early yaws. The remaining twelve patients had late yaws lesions, such as gumma, gangosa (rhinopharyngitis mutilans), osteoperiostitis, and dactylitis or indolent ulcerations". [From the caption for Fig. 6 it is apparent that the "ulcerous plantar lesions" were plantar papillomata or framboesiomata. It is strange that none of the early or secondary cases had any bone lesions.]

Rapid healing occurred after the following doses: patients over 10 years of age received 250 mgm., 5-10 years 200 mgm. and under 5 years 150 mgm. intramuscularly daily for 5 days. The drug was dissolved in sterile water, 250 mgm. in 5 ml. Treponemes disappeared within 24-72 hours and usually the lesions were dry within 48 hours. Framboesiomias were usually covered with crusts or healed within 5-7 days of starting treatment. Plantar lesions responded rapidly; pain was greatly reduced in 24 hours in

both types of lesions and by the 3rd week after the beginning of treatment healing was either complete or progressing very favourably. A series of photographs of a grossly involved hand in late yaws shows most remarkable recovery after 5 months. Gangosa was arrested. The late lesions sometimes needed more than one course. The general condition of all patients improved within 24 hours and severely malnourished children "speedily gained weight and strength and were able to play actively".

Reinfection was regarded as having occurred in 4 patients and relapses in 2 others. There were no systemic toxic reactions. The results after intramuscular oxytetracycline were similar to those after oral administration.

The authors stress the dramatic healing in late ulceration lesions after intramuscular and local application of the drug.

Twice the authors state that their patients "lived in villages or regions in which a yaws eradication campaign using 'one shot' doses of procaine penicillin recently had been conducted". [Unfortunately, no mention is made of their patients having received any procaine penicillin.] No serological observations are reported.

[The treatment of yaws is chiefly a matter of mass campaigns and in them the cost of the drugs is usually an important item.] *C. J. Hackett*

VENEREAL DISEASE RESEARCH INSTITUTE INDONESIA-SOURABAYA. **The Djuru Patek. The Man and his Work.** 35 pp., 17 figs. & 4 maps. 1953.

This is a popular description of the work of the *Djuru Patek*, the literal translation of which is a person skilled in or set to care for yaws. "Since birth he has been part and parcel of country life—he is essentially still a member of the village community." "But . . . this villager has become interested in the welfare of his fellow men, so that to serve their betterment he is glad to give part of the time of his every-day life." He may be a voluntary worker in the village administration, a teacher in the village school, or an active member of some village organization. Usually he is just a farmer who has assisted the male trained nurse in charge of the local polyclinic. The polyclinic is a rural centre for the treatment of the frequent but less serious ailments and is under the supervision of a doctor who visits the clinic at regular short intervals.

This practical nursing experience is amplified by an introduction to the simple administrative details of yaws diagnostic surveys. The *Djuru Patek* works through the village administration which is responsible for having the population available for survey either by congregation in one place or by remaining in their homes awaiting house-to-house survey. The village administrator knows everyone in the village well and explains to them the purpose of the survey and the results likely to follow treatment. About 500 people can be surveyed by the *Djuru Patek* in a day.

On a previously arranged day the *Djuru Patek* returns accompanied by the district doctor who checks the diagnoses of the former and orders treatment which the *Djuru Patek* gives. Few mistakes are found. The doctor, where necessary, improves the *Djuru Patek's* training. On this day, also, are surveyed those persons not seen on the previous occasion. If a second injection is to be given it is the *Djuru Patek* who gives it.

Periodic checking of the villagers is made by the *Djuru Patek*, to identify and treat new infections and relapses. From time to time an experienced team surveys the whole area to ensure the further complete eradication of yaws.

Since it is estimated that about 15 per cent. of the 75 million inhabitants of Indonesia are infected with yaws, the detection and treatment of the

disease is a major undertaking. The *Djuru Patek* is an important part of the work since all grades of trained staff are inadequate in numbers.

The anti-yaws campaign started in Jogjakarta under the direction of Dr. Kodijat. In the wide campaign against yaws UNICEF has supplied much of the penicillin, equipment and transport needed and some help has also been received from WHO.

Those seeking to become *Djuru Pateks* must have some elementary education and are trained in the recognition and treatment of yaws for about 6 weeks before they are sent into the field. At first they work under supervision of a trained nurse and are checked by the district doctor who is responsible for the campaign in his area. If the *Djuru Patek* is uncertain as to whether yaws is present or not in any patients, these are included among those with yaws. The *Djuru Patek* is also trained as a simple health educator.

In some isolated areas reliable, efficient and experienced *Djuru Pateks* have been in full charge of the campaigns. "Yet both for administrative and medical reasons, it is important that a doctor qualified in yaws treatment remains ultimately responsible; therefore, whilst this possibility remains open, practice of this modification depends upon the confidence of the district doctor in charge." The *Djuru Patek* is of greatest value in the country, though the teams of trained nurses originally used in anti-yaws campaigns still do valuable investigational work. An attempt in one area is being made to treat all contacts of infectious yaws patients. The work of the *Djuru Patek* in many areas has resulted in great reductions in yaws incidence. A moderate reduction in one area was from 7 per cent. to 0.9 per cent. after the first injection.

Among the consequences of anti-yaws campaigns is the development among the villagers of a sense of individual responsibility for communal health. Another is that the confidence of the people in the *Djuru Patek* assists the development of the nation-wide public health service.

[The employment of the *Djuru Patek* was largely developed by East Java anti-yaws workers. The *Djuru Patek* working from the polyclinics would appear to be an almost ideal arrangement and should result in effective and economical control of yaws followed by the gradual development of rural health services.]

C. J. Hackett

VENEREAL DISEASE RESEARCH INSTITUTE INDONESIA-SOURABAYA. **The Framboesia Campaign in Indonesia** [SOETOPO, M., Director]. 11 pp. 1953.

This paper was presented before the 10th International Congress of Dermatology in London, July 1952, and reports anti-yaws work in Indonesia since 1914.

Pre-war investigations suggested an incidence of yaws of 15 per cent.; 40 per cent. of patients were infectious, and of these 75 per cent. were children.

In 1934, KODIJAT developed his method of systematic yaws control, the essentials of which are:

- "(a) detection and registration of all cases of yaws by examining as far as possible the entire population, village by village, household by household, and person by person.
- "(b) treatment of all patients found, with emphasis on treatment of infectious cases.
- "(c) periodic control of the treated areas and treatment of relapses and new cases.

“(d) detection, registration, selection and treatment were done in the villages themselves, and treatment was given free of charge”.

The effectiveness of the campaign depended on the full attendance of the villagers and this largely depended on the cooperation of the village officials and civil administration.

The anti-yaws campaign in Indonesia initiated by the Indonesian Government, with supplies and assistance from UNICEF and technical advice from WHO, started in May 1950. During the next 2 years over 2,260,000 persons were surveyed out of a population of 3,337,000 and 369,922 persons suffering from yaws were found, an average yaws incidence of 16.4 per cent.: 363,427 cases were treated [2 injections of procaine penicillin in aluminium monostearate of 4 ml. each (1.2 million units) were used for adults]. The work was undertaken by teams consisting of 5 qualified male nurses, 2 field clerks, headed by a senior nurse. These teams worked under the supervision either of doctors engaged full time in such work or under the local Regency physician. There was, however, a great shortage of doctors (1 in 60,000 of the population) and nurses (1 in 20,000).

To overcome this shortage a simplified yaws control method was devised. This is based upon the services of the *Djuru Patek* [see above] who is the assistant of the qualified nurse at the polyclinic. The work consists of

- I. systematic detection of yaws cases.
- II. treatment of the detected cases.
- III. resurvey of population and follow-up of treated patients.
- IV. administration.

Statistical data required are greatly reduced.

In many areas treatment of yaws at dispensaries on special days will remain of importance. There are 1,250 dispensaries in Indonesia of which 500 are attached to hospitals.

In 2 areas 9–12 months after a campaign [presumably by teams of the Treponematoses Control Project or TCP] 84.7 per cent. of the yaws patients were clinically cured. The 15.3 per cent. of yaws patients found (3.14 per cent. of the total persons examined) were mostly relapses. Among the persons not examined at the initial mass treatment only a few were found to have yaws, 0.7 per cent. of the total examined. “The bulk of yaws found during the resurvey comprises people examined during the general campaign and found not suffering from yaws at that time; in total 10.49 per cent. of the number of people re-examined.”

In 2 areas in East Java after a campaign by *Djuru Pateks* (the TCP simplified campaign), the incidence of yaws was reduced from 20 to 6 per cent. and 16 to 5 per cent. “Spreading of the infection after the initial survey must be due to the latent cases which showed no symptoms during the survey. Most sources of infection have been found in school-age and toddler group.”

The aim in Indonesia is to combat yaws by the mass treatment of the estimated 12 million yaws patients and to protect the remaining 60 million healthy persons from infection. The anti-yaws campaign is to be extended by the use of the TCP simplified method first used in East Java. Continual research will also be undertaken to improve the technique.

The paper concludes: “I will not end before remembering the meritorious work done by the Dutch research workers in the domain of the clinic of yaws, without which our work will have encountered still greater obstacles. We are proud, however, to be able to point out the real Indonesian origin of the framboesia campaign now proceeding in our country”.

[Much good work has been done by the Indonesian anti-yaws workers and much of value should come from the further study of the wealth of data

collected by the teams during the time they have been in existence. As is the principle everywhere now, detailed work by teams is reserved for investigation and in all mass campaign work simplicity with effectiveness and speed must be the rule. In this paper is again emphasized the great importance of latent secondary cases who may present no symptoms at one survey but have infectious relapses at the next. Their importance in mass campaigns is obvious.]

C. J. Hackett

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MADRID. VI Congreso Internacional de Leprologia. Resumenes. 3 al 10 de octubre de 1953. [Abstracts of Papers at the Sixth International Congress of Leprology held in Madrid from the 3rd to the 10th October, 1953] 143 pp. 1953.

It is no easy matter to summarize a book of 155 abstracts of scientific papers, but a brief review of this collection of works must be attempted. It is interesting to see the comparative interest taken in the various aspects of the leprosy problem as shown by the number of papers dealing with each of the divisions of the subject. Thus there are 11 papers on classification, 41 on treatment, 32 on immunology, which include 12 on BCG, and 19 on epidemiology. It is particularly noticeable that pathological anatomy and bacteriology have only 8 papers between them, subjects which some years ago attracted a far larger proportion of attention.

Among the 11 papers dealing with classification, there is a fair degree of unanimity, owing partly to the discussions previously carried out by WADE in the *International Journal of Leprosy*, and partly to the work of the WHO Committee in Brazil. It is satisfactory that the Committee of the Congress dealing with this subject was able to arrive at decisions which are likely to be accepted generally [see this *Bulletin*, 1954, v. 51, 592].

Of the 41 papers on treatment, 11 are studies of the general aspects, and 12 deal with sulphones compared with nearly twice that number at the previous Congress in 1948. This does not mean that less interest is taken in sulphones, but rather that this form of treatment is now generally accepted as that of choice.

Immunology is the subject which excites most interest and produces most papers. This is chiefly the result of the hopes that have been raised of our having in BCG a means of raising resistance to leprosy and a prophylactic which will at least diminish the proportion of open infective cases and thus indirectly diminish the spread of infection.

There are only 2 papers classified under the heading of control, but some of those on epidemiology mention the means taken for control as a result of epidemiological investigations. Perhaps the interest in control, the most important from the public standpoint of all the aspects of leprosy, has to a certain extent been suspended pending the final verdict on the effectiveness of BCG. Effective means of control require devoted staffs, whether or not the first hopeful reports of the action of BCG are confirmed, and it is extremely difficult to find such staffs in most countries.

It would be invidious to mention particular papers, though as always the relative value varies considerably, and in any case it is not always possible to assess a paper's value from an abstract. It is understood, however, that the more important papers will be published shortly in the *International Journal of Leprosy*.
Ernest Muir

FLOCH, H. & RIVIEREZ, M. Discussion sur le rôle possible de l'hérédité dans la transmission de la lèpre. [**Discussion of the Possible Rôle of Heredity in the Transmission of Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 922-5.

The case is described of a child born of a mother who had suffered from leprosy. This child developed a lesion on the left buttock on the 8th day after birth, and this gradually spread to the hip and to the back. On repeated smears and biopsy no bacilli could be found. The lesion continued till the death of the child at the age of between 2 and 3 months. The biopsy showed diffuse cellular infiltration in the superficial part of the dermis and distension of blood vessels. The question is discussed whether leprosy can be hereditary, and it is concluded that this is not possible but that very occasionally there may be a congenital infection in the uterus.
Ernest Muir

MONTESTRUC, E. Vaste léprome bacillifère chez un enfant de trois mois né de parents sains. (Coexistence d'une tache mongolique.) [**Extensive Bacillary-Positive Lepromatous Lesions in a Child of Three Months born of Healthy Parents**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 877-80.

At the time of examination the child was 3 months old. Leprous lesions covered about one-fifth of the body surface and numerous bacilli were found in serum taken from the lumbar region. The dermal lesions were first seen when the child was 2 months old. As far as the authors know this is the earliest age at which lepromatous leprosy has been found. As the parents were healthy it is presumed that infection was obtained from the father's sister who not only had leprosy but had nodules of the elbows rich in bacilli. When leprosy occurs in infants it has been suggested that infection takes place in the uterus, but here there is no question of this as the mother was healthy, and the danger of familial or cohabitational contagion is clearly shown. There was also a small naevus showing through the leprous lesion, but this is not supposed to have any connexion with the leprous infection.
Ernest Muir

MONTESTRUC, E. A propos de la classification de la lèpre de R. CHAUSSINAND. (La réaction d'héماغglutination dans les différentes formes de la lèpre.) [**The Classification of R. Chausinand and the Haemagglutination Test in the Different Forms of Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 985-91.

This is a plea that the simple form of classification advocated by Chausinand should have added to it the haemagglutination test results (Middlebrook and Dubos) as a mean of dividing the 3 principal forms of leprosy. Results of a number of tests are tabulated in support of the proposition: not only were more positive results obtained in the lepromatous form, but the mean titres were very much higher.
Ernest Muir

FLOCH, H. & SOHIER, R., with the technical collaboration of BUISSIÈRE. La réaction d'héماغglutination à la tuberculine (type Middlebrook-Dubos) dans la lèpre. [**The Haemagglutination Reaction to Tuberculin (Type Middlebrook-Dubos) in Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 918-22.

The reaction was tested in the sera of 102 leprous patients. In lepromatous cases positive results were higher (64.5 per cent.), than in tuberculoid (25.9 per cent.) and indeterminate cases (22.8 per cent.). It might be convenient to study this test as additional biological evidence in the diagnosis and prognosis of leprosy. Ernest Muir

FLOCH, H. & SUREAU, P. La réaction universelle de Kahn dans la lèpre. [**The Kahn Universal Reaction in Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 992-1001, 3 figs.

It has been claimed that this test [this *Bulletin*, 1951, v. 48, 997] will distinguish between syphilis, yaws and lepromatous leprosy, and that it can be used in assessing the improvement of leprosy patients under sulphone treatment. The authors, after studying 21 cases of leprosy by means of this test form a different opinion. They found that the Kahn Universal Reaction never gave the characteristic diagram described by Kahn and others. They admit that after a sufficiently long period of treatment of a lepromatous case the increased precipitation is diminished, but this is true also of the tuberculoid case. The Universal Reaction is tedious to carry out, and the authors consider that its real utility is limited at most to prognostic value, but there are other means of judging the progress of patients. Ernest Muir

MARKIANOS, J. Action éventuelle de l'injection de lépromine sur l'apparition de la lèpre et sensibilité tardive à cet antigène provoquée par la vaccination au BCG. [**Eventual Effect of Lepromin Injection on the Appearance of Leprosy and Delayed Sensitivity to this Antigen Provoked by BCG Vaccination**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 30-32.

The following is a translation of the author's summary:—

Leprosy became manifest 21 days after injection of lepromin in a child having a negative Mitsuda reaction, who had been separated from leprous parents for 22 months. The question is posed whether the injection of this antigen had favoured the appearance of a previously latent infection. Later, BCG vaccination resulted in a positive Mitsuda reaction 194 days after this single injection of lepromin [see also this *Bulletin*, 1951, v. 48, 1121]. H. J. O'D. Burke-Gaffney

BLANC, M., PROST, Marie T. & MARIE-SUZANNE (Soeur). Influence de l'injection d'une suspension d'un mycobactérium isolé d'un cas de lèpre (souche Chauviré) sur la réaction de Mitsuda. [**The Influence of the Injection of a Suspension of the Mycobacterium Isolated from a Case of Leprosy (Chauviré Strain) on the Mitsuda Reaction**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1009-14.

This is a suspension in normal saline of a mycobacterium isolated from a leprous patient, cultivated in Sauton's medium, and killed by heating to 120°C. This antigen is not the mycobacterium of leprosy as it gives a

positive reaction when injected intradermally into cases of leprosy of the lepromatous type. It is claimed that of 339 subjects studied, 240 (70.8 per cent.) had a negative Mitsuda reaction, that after injection of this antigen in these 240 subjects 155 (64.5 per cent.) became Mitsuda-positive, and that of the lepromatous cases [it does not say how many or their general condition] 50.8 per cent. became Mitsuda-positive.

Ernest Muir

PENNEK, J. Essai de traitement de la réaction lépreuse par l'acétate de delta-5-prégnénolone. [**Trial of Treatment of Lepra Reaction with Acetate of Delta-5-Pregnenolone**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 889-96, 2 charts.

The author was led to try this substance as being considered a "cortisone-like" body and therefore likely to control allergic conditions. Only two patients were treated. In one of these there was lasting remission of reaction, and in the other the remission was only temporary. The dose was 10, diminishing to 8, tablets daily, of 100 mgm. each.

Ernest Muir

WAALER, E. Lepra og cancer. [**Leprosy and Cancer**] *Nordisk Med.* 1954, Apr. 1, v. 51, No. 14, 481-2, 2 figs. [16 refs.]

The English summary appended to the paper is as follows:—

"A case with basal cell carcinoma and leprosy in the same lesion is reported, together with a review of the literature on this subject. The old presumption that leprosy to some degree protects the patient against cancer is not supported in the modern literature. The occurrence of skin cancer in leprosy granulation tissue does not appear to be very common, and the combination of the two diseases in the same lesion is mainly of diagnostic interest."

PARLANGE, J. A. Revue clinique et thérapeutique sur la lèpre oculaire. (Données classiques et travaux récents.) [**Clinical and Therapeutic Review of Ocular Leprosy**] *Maroc Méd.* 1953, Aug., v. 32, No. 339, 763-9. [48 refs.]

This paper consists of a review of the ocular manifestations of leprosy, together with an up-to-date review of the use of modern drugs.

The conclusion is reached that the use of sulphone compounds is beneficial to ocular leprosy.

D. P. Choyce

LAVIRON, P., LAURET, L. & JARDIN, C. Traitement de la lèpre par les injections hebdomadaires de suspensions de T. B. 1. (Note préliminaire.) [**Treatment of Leprosy with Weekly Injections of TB-1 Suspensions**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 886-9.

The suspension consists of 60 gm. of crystallized TB-1 in 460 cc. of a mixture of equal parts of neutral chaulmoogra oil and chaulmoogra ethyl esters with 4 per cent. of guaiacol. Of this the patients received 5 cc. weekly, equal to 600 mgm. of TB-1. The trial had only lasted from 3 to 5 months, but already 70 per cent. have shown amelioration. It is hoped by further trials to study the absorption and work out the dosage. In the 25 patients already treated there were no adverse signs apart from slight local pain and occasional slight reactions.

Ernest Muir

LAVIRON, P., LAURET, L. & SCHNEIDER, J. Étude de l'activité antilépreuse des thiosemicarbazones. [**Study of the Antileprous Activity of the Thiosemicarbazones**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 880-85.

In addition to TB-1 the authors tried out 3 other allied derivatives (4544, 4545 and 4546 RP); in none of these 3 were the results encouraging or comparable to those obtained with TB-1. With the last (TB-1) 38 patients were treated. Of 32 lepromatous cases 20 showed much improvement after periods varying from 12 to 38 months' treatment, and 9 showed less improvement. Of 3 tuberculoid cases 2 showed considerable improvement, and of 3 undifferentiated 2 showed much improvement. The authors consider that clinical improvement with TB-1 is equal to that with sulphones, but that the bacteriological action is less marked. TB-1 may be used as a complement to, or a substitute for, sulphones, but it should only be used under hospital conditions or for individual medication. *Ernest Muir*

CHAUSSINAND, R., GABBAÏ, A., DORENLOT, H. & VIETTE, M. Action de l'hydrazide de l'acide isonicotinique sur la maladie de Hansen. [**The Action of Isoniazid in Leprosy**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 905-10.

After treating 44 patients, 31 of whom were lepromatous, for periods varying from 3 to 12 months with isoniazid alone or in association with DDS, the authors found that isoniazid was well tolerated in daily doses up to 7 mgm. per kgm. of body weight. There were cutaneous improvements in 13 lepromatous and 1 indeterminate, but there was aggravation of nerve symptoms in some of the tuberculoid cases. Isoniazid is better tolerated but less effective than the sulphones. It cannot be recommended by itself, but may be used with profit along with the sulphones, and more trials should be made of this combination. *Ernest Muir*

LAVIRON, P. & LAURET, L. Essais de traitement de la lèpre par l'hydrazide de l'acide isonicotinique (I.N.H.) seul ou associé à la diamino-diphénylsulfone (D.D.S.) et à la streptomycine. [**Treatment Trial of Leprosy with Isoniazid either alone or in Combination with Dapsone (DDS) or Streptomycin**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 896-9.

Under the different categories 18, 9, 10 and 10 patients were treated for 5 months, the daily dose of isoniazid rising to as much as 500 mgm. The only improvement was an increase of weight which occurred in 80 per cent. of the patients. The only patients who improved as regards the disease of leprosy were those who were getting small amounts of DDS. *Ernest Muir*

FLOCH, H. Intérêt du benzal-isonicotyl-hydrazone-méta-sulfonique en thérapeutique antilépreuse. [**The Use of Isonicotyl Hydrazone of Metasulphobenzaldehyde Treatment of Leprosy**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 21-5.

The author has already reported on his results with isoniazid [this *Bulletin*, 1954, v. 51, 599 and below]. Since then he has treated for 10 months 18 patients, 8 of whom were lepromatous, with the sodium salt of isonicotyl hydrazone of metasulphobenzaldehyde (G.605). With one exception they all benefited, 2 improved very much and 4 became bacteriologically negative. In the author's opinion the risk of drug resistance to G.605 is similar to that with isoniazid, but the former is active and can be used

with profit in association with sulphones in the treatment of leprosy. The average supported dose was 3 gm. daily. For details of actual cases, the original should be consulted.

Ernest Muir

FLOCH, H. Les hydrazides dérivés de l'acide isonicotinique. Leur essai (notamment celui du benzal isonicotyl-hydrazone métasulfonique) en thérapeutique antilépreuse. [**The Hydrazides Derived from Isonicotinic Acid, their Trial in the Treatment of Leprosy (Especially that of Isonicotyl Hydrazone of Metasulphobenzaldehyde)**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 308. 1953, Dec., 10 pp.*

As the consensus of opinion is that isoniazid is of little use in the treatment of leprosy, the author considered certain other kindred substances and chose from among them the sodium salt of isonicotyl hydrazone of metasulphobenzaldehyde (G.605). He found that patients tolerated this drug in about 10 times the dose of isoniazid and that the results were much more favourable. For adults the most suitable daily amount was 3 gm., larger doses producing gastric disturbances. In 6 lepromatous cases there was bacteriological as well as clinical improvement. A borderline case became bacteriologically negative after 6 months' treatment. As there is a danger of bacilli becoming drug-resistant the author prefers to use G.605 in combination with sulphones.

Ernest Muir

FLOCH, H. & SUREAU, P. Quelle est la place de l'isoniazide dans la thérapeutique antilépreuse? [**What is the Place of Isoniazid in the Treatment of Leprosy?**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1001-9.

See this *Bulletin*, 1954, v. 51, 599 and Floch, above.

CHAUSSINAND, R., COLIEZ, R., LEFEBVRE, J., LOISEAU, A. N. & VIETTE, M. Essai de traitement des griffes cubitales dans la maladie de Hansen par les ultra-sons. [**Trial of Treatment of Ulnar Deformity in Leprosy by means of Ultra-Sonic Waves**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 899-904.

A quartz electric generator of a frequency of 1 megacycle was used, and the terminal was applied along the course of the ulnar nerve for 8 to 10 cm. above and below the elbow, being the part where the nerve is most superficial. In 2 out of 3 patients with marked claw-hand there was marked improvement, which occurred during the time of the application. The authors suggest that this method should be used on a larger scale.

Ernest Muir

MURAZ. Note préliminaire sur une organisation rationnelle, en Afrique Equatoriale Française, de la lutte contre la lèpre. [**Preliminary Note on a Rational Organization for the Fight against Leprosy in French Equatorial Africa**] *Bull. Acad. Nat. Méd.* 1954, v. 138, Nos. 9/10, 155-9.

From recent surveys it is calculated that there are in the French West African territories of Oubangui-Chari, Tchad, Middle Congo and Gabon no fewer than 56,670 sufferers from leprosy. In one district of 14,858 inhabitants more than 10 per cent. suffer from leprosy. At the end of 1953 only about one-fifth of the known cases were under treatment. The scheme proposed is to form villages for leprosy patients, some 78 of these for the

whole Federation. Treatment would be given in the form of injections of sulphone (DDS) suspended in chaulmoogra esters twice a month. There would be a large staff of doctors and assistants and, at first, selected treatment centres. Transport would be furnished by 15 motor-vehicles and 62 bicycles. In the leprosy villages there would be mass oral vaccination with BCG, if its value is confirmed, and arrangements would be made for improved agriculture, horticulture, etc. They would be arranged in a manner similar to the villages already in existence for the prophylaxis of sleeping sickness. [The author originally advocated such measures nearly 3 years ago: see this *Bulletin*, 1952, v. 49, 411.] Ernest Muir

HOBBY, Gladys L., HANKS, J. H., DONIKIAN, Mary A. & BACKERMAN, T. **An Evaluation of Chemotherapeutic Agents in the Control of Experimental Infections due to *Mycobacterium leprae* murium.** *Amer. Rev. Tuberculosis*. 1954, Feb., v. 69, No. 2, 173-91, 9 figs. [13 refs.]

This paper describes a laboratory method which may serve to determine the efficacy of drugs in the treatment of leprosy, although the authors acknowledge that argument from murine leprosy to human may not entirely apply and that in any case clinical confirmation is necessary. Mice were inoculated intraperitoneally with a suspension of rat testis infected with the Hawaiian strain of *Myco. leprae murium*. The spleens from mice killed at intervals were homogenized by an elaborate process and acid-fast bacilli counted in films made by a quantitative method. Various control experiments showed that successive counts made in this way were reproducible and reflected accurately the progress of the disease. Therapeutic tests on this basis showed that isoniazid and a chemical isoniazid-streptomycin combination (streptomycylidene isonicotinyl hydrazide) were the most effective drugs, streptomycin and viomycin being next most effective and more so than Promin. Oxytetracycline (terramycin), actithiazic acid, amithiozone, carbomycin and DDS (dapsone) were ineffective. It is pointed out that clinical evidence of the efficacy of some of these drugs is unsatisfactory or contradictory and implied that further clinical trials based on laboratory evidence such as that described in this paper should be instituted. L. P. Garrod

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllobothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

GALLIARD, H., LAPIERRE, J., LARIVIÈRE, M. & BERDONNEAU, R. Test de Thorn à l'A.C.T.H. et autres épreuves du fonctionnement cortico-surrénal dans des cas d'infestation par les helminthes. [The Thorn Test and Other Tests of Adrenocortical Function in Helminthic Infections] *Ann. Parasit. Humaine et Comparée*. 1953, v. 28, Nos. 5/6, 372-86. [21 refs.]

This paper represents one of a series of contributions by the senior author and his colleagues on the effects of the adrenal hormones on the eosinophilic response of vertebrates to certain helminth infections, and it should be read in conjunction with their previous papers [this *Bulletin*, 1954, v. 51, 299,

418]. It should be noted that in the series of 26 cases of helminth infection mentioned below, the test injection in each case was a single intramuscular injection of 25 mgm. corticotrophin.

The following represents the essential points dealt with in the summary. Of 6 cases of *Strongyloides stercoralis* infection the test was negative in 3 and positive in 3. In a mixed infection of *S. stercoralis* and *Schistosoma mansoni* the result was negative. In 2 cases of *Trichuris trichiura* infection, one was positive and one was negative. In a single case of *Necator americanus* infection, the test was positive but a case of *Ancylostoma duodenale* was negative. One case of *Ascaris* infection was positive. In 12 cases of mixed infection with *Loa loa* and *Dipetalonema perstans* 9 of the patients gave a negative result and 3 gave positive results. In 3 cases of eosinophilia of unknown origin the test was negative. Why certain of the cases failed to respond to corticotrophin remains to be discovered. It is possible that there exists often in these helminth carriers a sluggishness in the response of the suprarenal cortex, which can be overcome only by very large doses of the hormone, by continuous treatment or by perfusion. But no explanation is entirely satisfactory for it is not possible to explain why persons of the same race and same age, living under exactly the same conditions of life, differ completely in their reactions, and one must reach the conclusion that the effect of parasitism on the function of the suprarenals is essentially individualistic. That the test may have some diagnostic value is suggested by the fact that patients from the Tonking area of Indo-China who had an eosinophilia which was unaffected by treatment with 25 mgm. of corticotrophin, were ultimately shown to be infected with *Wuchereria malayi*.

R. M. Gordon

SCHWETZ, J., BAUMANN, H. & FORT, M. Sur les schistosomes actuellement (en 1953) connus en Afrique. [**The Schistosomes Known At Present in Africa**] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 687-96, 38 figs. on 10 pls. [13 refs.]

This paper contains nothing new but is a summary of the authors' views regarding what species of schistosomes should be regarded as parasitizing mammalian hosts in Africa and what are the various species of snails concerned in their transmission. The authors consider there are 6 distinct species, *Schistosoma matthei*, *S. intercalatum*, *S. rhodhaini*, *S. haematobium*, *S. bovis*, *S. mansoni* and one variety *S. mansoni* var. *rodentorum* Schwetz. As regards the molluscs responsible for their transmission, they consider that those schistosomes producing eggs with a lateral or sub-terminal spine are transmitted by the planorbis snails and those producing eggs with a terminal spine by the "*Bulinus-Physopsis*" group. If the reader asks, "by which species of snails in the 'planorbis' and which in the '*Bulinus-Physopsis*'?" the authors reply, "our answer is simple: by all the planorbis and by all the *Bulinus-Physopsis*. By all, but not with the same readiness, the strain and the degree of adaptation playing an important part" [abstracter's translation].

R. M. Gordon

SCHWETZ, J. Sur quelques rongeurs sauvages et une musaraigne du Congo, hôtes naturels de deux schistosomes. [**Certain Wild Rodents and a Shrew from the Belgian Congo Naturally Infected with Two Schistosomes**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1953, v. 24, No. 4, 1453-63, 1 map & 10 figs. on 2 pls.

The author's summary in French is translated freely as follows:

The discovery of *S. rodhaini* Brumpt in rodents of Elisabethville led us to

examine wild rats and mice of Jadotville, Sakania and Albertville for this parasite. Infected rats were not found at Jadotville, but at Sakania and especially at Albertville we found in certain rodents not only *S. rodhaini* but also another schistosome resembling that concerned in human intestinal schistosomiasis. These two schistosomes were found especially in two rodents of aquatic habits, *Dasymys bentleyae* and *Pelomys fallax*, and also in *Lophuromys aquila*. *Mastomys coucha*, a ubiquitous species, was rarely infected though many were examined. Rodents living far from water, *Tatera-Gerbiliscus*, were not found infected.

J. J. C. Buckley

TORREALBA, J. F., VICENTE SCORZA, J., SERPA SANABRIA, M., DÍAZ VÁZQUEZ, A., ITALIA RAMOS, B., RICCARDI, B. & SEGUNDO JORDÁN, L. Nota preliminar sobre la acción malaquicida del fruto de Paraparo (*Sapindus saponaria* L.). [**Preliminary Note on the Molluscicidal Action of the Fruit of Paraparo**, (*Sapindus saponaria*)] *Gac. Méd. de Caracas*. 1953, Oct.-Dec., v. 61, Nos. 10, 11 & 12, 299-307. English summary (7 lines).

The authors, knowing the toxicity of certain plants for aquatic animals, thought that they might have a similar action on water-snails, especially *Australorbis glabratus*, and by way of trial they tested the effect of aqueous and alcoholic solutions of the epimesocarp of *Sapindus saponaria*, locally the paraparo fruit. They found that a maceration of a strength of 1 part in 10,000 is lethal and retains its potency for 10 days. The same material is used by the people of Anzoátegui for killing fish.

The authors describe in detail the preparation of an extract in hot water or in 90 per cent. alcohol, obtaining a colloidal suspension, and, by drying, a yellow powder. This extract they tested in dilutions from 1 in 1,000 to 1 in 100,000. Four litres of each dilution were used and 100 snails. One gm. in 1,000 cc. killed them all immediately; 1 in 10,000 killed all in 12 minutes and 1 in 20,000 in 15 minutes; 1 in 40,000 in 6 hours; 1 in 50,000 killed 94 per cent. in 24 hours; with 1 in 100,000 all survived. A long list of protozoa, rotatoria, oligochaetes and crustacea is given on which the action has been tested. [A little doubt is cast on the results recorded; e.g., in the Ciliata section, of 16 tested 7 showed "100 per cent. survival" and 9 showed 100 per cent. fatality. There are no intermediate figures.] Water insects, e.g., larvae of *Chironomus*, *Culex*, *Anopheles*, *Dytiscidae* and others proved refractory to its action.

For trial of the effect on laboratory animals the authors gave to batches of 40 white mice the 1 in 20,000 dilution for 4 days without seeing any signs of toxic action. In other lots of 25 they injected subcutaneously and intraperitoneally up to 6.6 gm./kgm. without effect, but with amounts exceeding this death occurred within 24 hours. The authors conclude that the extract would be useful for controlling small foci of *Australorbis glabratus*.

H. Harold Scott

MELENEY, H. E. **Problems in the Control of Schistosomiasis.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 209-18. [30 refs.]

This lecture begins by emphasizing that, with the exception of malaria, schistosomiasis is the most important parasitic disease of man, affecting about 5 per cent. of the world's population. The evidence indicates that the endemic areas of all 3 species of schistosomes have increased recently and will continue to do so. Extensions to previously uninfected areas are possible; for example, it has been shown that potential hosts of *Schistosoma mansoni* and *S. japonicum* exist in the United States of America.

The life histories of the 3 schistosome species are briefly described and the various methods of attacking different points in the transmission cycle are discussed. In regard to chemotherapy it is pointed out that though the drugs available for mass treatment are not very satisfactory they do at least decrease disability and death, and by reducing the discharge of eggs in the excretions they lower snail infection rates. Control by the sanitary disposal of human excreta is practically impossible at present. Human faeces are an economic necessity for rice growing, and fresh faeces are said to be best for seed beds. Storage of mixed faeces and urine for 3 weeks will kill the miracidia in the eggs but is impracticable. A cheap miracidal poison which could be added to night-soil and which could act as a fertilizer would be valuable. Religious customs might be adapted to safeguard health, for example, by educating religious leaders in Moslem countries and gaining their cooperation in devising ways of avoiding contamination of water or exposure to infested water during ablution. Protection of indigenous people against cercarial invasion is impracticable also but water treated with cercaricides might be provided for domestic purposes. Control of the intermediate host by biological and molluscicidal means has an advantage over other methods in that it can be conducted without the cooperation of the people. In Egypt biological control methods have had only a temporary effect. Molluscicides are the simplest approach to control but they have not so far eradicated the snails in any field programme. The newer and more effective compounds are at present too expensive for use in any large endemic region but in small endemic areas they should receive a thorough trial.

The lecture ends with the reassuring comment that schistosomiasis is now at a stage comparable to that of malaria 2 decades ago. Research must therefore be vigorously prosecuted and generously supported. Progress in control of this infection will be brought about by educating the people and by the combined skills of workers in widely differing fields, all directing their efforts to the solution of this problem.

T. H. Davey

KOMIYA, Y. & YASURAOKA, K. **The Behaviour of *Oncomelania nosophora*, the First Intermediate Host of *Schistosoma japonicum*, in Water.** *Japanese J. Med. Sci. & Biol.* 1953, Oct., v. 6, No. 5, 451-61, 4 figs.

Oncomelania (Katayama) *nosophora*, the first intermediate host of *Schistosoma japonicum* in Japan, is amphibious and rarely stays in deep water. It is usually found in or on moist soil just above the water's edge or on moist vegetation above the water level. The cercariae, however, emerge from the snails only when the snails are in water. It is not known whether the snails actively creep into water, but they may be submerged when their habitats are flooded by rains, irrigation or other means. The time during which the snails may thus remain submerged is therefore important, because it is then that the cercariae emerge.

The authors placed snails of this species, and of different sizes, in water in glass cylinders 36 cm. tall. About 60 to 70 per cent. of the snails that had been submerged to a depth of 10 to 20 cm. crept out of the water at various intervals during the next 24 hours. When snails that had crept out of the water were submerged to a depth of 10 cm. together with snails that had not crept out of the water there was no significant difference between the behaviour of the snails of these 2 groups. Tracings of the routes followed by the submerged snails showed that they followed no definite direction and did not always creep out of the water, some creeping along the water margin and some creeping out and then creeping in again.

G. Lapage

CHUNG, Huei-lan, CH'EN, Chien-hung & HOU, Tsung-ch'ang. **Preliminary Observations on Efficacy of Chloroquine in Treatment of Paragonimiasis.** A Report of Three Cases. *Chinese Med. J. Peking.* 1954, Jan.-Feb., v. 72, No. 1, 1-14, 8 figs. on 4 pls.

The treatment of paragonimiasis has hitherto not been satisfactory; emetine is given, but it is not specific in its action and it is a toxic drug. Encouraged by the success of chloroquine in other trematode infections, the authors decided to use this drug in the treatment of paragonimiasis. They report the results in 3 cases.

The first patient was a child of 5 years, originally diagnosed as pulmonary tuberculosis and given treatment with streptomycin and PAS; later, when the correct diagnosis was made, intramuscular emetine and subsequently intravenous potassium antimony tartrate were given without much effect. Chloroquine was then given by mouth, at first in smaller doses but later in doses of 0.125 gm. thrice daily, over a period of 2 months. There was a dramatic reduction in the number of ova in the gastric juice and sputum (*e.g.* from 75,000 to 5 and 1), and those that remained appeared degenerated, and ova disappeared from the stools early in the course of treatment. The parasitological was accompanied by both radiological and clinical improvement.

The second patient was a child of 6 years. In this case also, emetine and potassium antimony tartrate had previously been given. The same dosage of chloroquine was employed and the parasitological response was quite marked, but less striking; in sputum, gastric juice and stools, a few ova were found even at the last examination (treatment was being continued).

The third patient was an adult. He had received more prolonged, but no more successful, treatment with emetine. He had marked cerebral as well as lung symptoms, and fever, 38° to 40°C.

Under chloroquine treatment his clinical condition improved steadily and the improvement in his mental condition was striking: he received 32.5 gm. in a period of about 2 months. He developed a mild itching dermatitis in the middle of the course and treatment was suspended; later, when it was resumed, there was no recurrence of this symptom.

Complement-fixation tests were done on the blood and cerebrospinal fluid; the former was positive in all 3 cases and the latter in the third case only. Intradermal tests were positive in all 3.

L. E. Napier

CORT, W. W., AMEEL, D. J. & VAN DER WOUDE, Anne. **Parasitological Reviews. Germinal Development in the Sporocysts and Rediae of the Digenetic Trematodes.** *Exper. Parasit.* New York. 1954, Mar., v. 3, No. 2, 185-225, 49 figs. on 4 pls. [Numerous refs.]

ISHII, K. **A Differential Staining for Living and Dead Larval Trematodes.** *Japanese J. Med. Sci. & Biol.* 1953, Oct., v. 6, No. 5, 481-5, 4 figs. on pl.

The author sought for a method of staining the larvae of trematodes which would determine whether they were dead or not. He gives a list of techniques proposed by earlier workers and, after referring to the technique proposed by LUYET (*Science*, 1937, v. 85, 106), he describes a method which uses a solution of neutral red which penetrates into both living and dead cells. A solution of KOH is then added, which penetrates into dead cells only and turns the dead cells orange-yellow, the living cells remaining bright red. Organisms that are not quite dead may show intermediate tints.

Ishii applied this method to the miracidia of *Fasciola hepatica*, miracidia and cercariae of *Schistosoma japonicum* and other cercariae and always

obtained good results in comparison with results obtained with techniques that depend on the movements of the body-cilia and the cilia of flame cells. When 100 motile miracidia were tested with 1 per cent. NaCl for 5 minutes, movement of the body-cilia ceased in all of them, but the cilia of the flame cells were motile in 13. The NaCl was then washed out and, after 5 minutes, none of the miracidia showed movement of their body-cilia, but the flame cell cilia of 81 of the 100 were then moving. The neutral-red-KOH reaction was then applied and 97 of the miracidia took on the bright red tint that showed that they were still alive. After about 30 minutes 90 to 100 per cent. of the miracidia were usually swimming. The author concluded that the neutral-red-KOH reaction is more accurate than observation of the movements of the body-cilia and the cilia of the flame cells.

The author's procedure now is to mix equal volumes of the medium containing the larvae and freshly-prepared 0.1 per cent. aqueous neutral red. The larvae are left in this for 30 to 60 seconds and "one-half volumes" of 0.1 per cent. KOH is then added. All the dead organisms may not turn orange-yellow for 20 to 30 minutes. Reagents that are possibly toxic to the organisms should be removed before the test is done and it is better to wash the organisms before the test in order to remove any salts in an acid or alkaline medium that may disturb the reaction.

G. Lapage

SPHANGOS, J. [On a Second Case of Human Distomiasis in Greece]

Reprinted from *Elliniki Iatriki*. Salonica. 1954, v. 23, No. 1, 5 pp.
[In Greek.] English summary.

The author found eggs of *Heterophyes heterophyes* in the faeces of a woman aged 52 residing in Missolonghi in Greece. The patient had suffered for 10 years with severe abdominal pain of an intermittent nature together with constipation alternating with diarrhoea for a few days at a time.

The author had seen a similar case in 1953 in the same city. Neither patient had ever travelled outside Greece and one of them had rarely left Missolonghi. The infection was thus acquired locally. Both patients were accustomed to eating smoked salted fish of the species *Mugil cephalus* which are common in the sea lake of Missolonghi.

H. J. O'D. Burke-Gaffney

GINSBERG, A. "Zoonoses in Kenya". *East African Med. J.* 1954, Mar., v. 31, No. 3, 81-8. [10 refs.]

The title of this paper is misleading, because—apart from two short preliminary paragraphs dealing with the need for controlling zoonoses through veterinary units within the framework of public health departments—it deals exclusively with *Taenia* infections.

The author is a veterinarian, with considerable experience of cattle and the meat industry in Kenya, and he outlines some of the practical points connected with surveys, meat inspection and control of taeniasis.

The incidence of *Taenia* infections in Kenya is unknown, and although hygiene has improved greatly since DAUBNEY and CARMAN reported an incidence of 50 per cent. in the stools examined in a Government reformatory 25 years ago [this *Bulletin*, 1928, v. 25, 932] meat is still prepared and consumed in primitive conditions in rural areas of Kenya.

The author and his colleagues have examined some 12,000 head of cattle at Athi, and as a result of 3 random inspections covering 14 days, they found that 358 of 1,648 cattle (21.7 per cent.) were infected with *Cysticercus*

bovis. As 56.5 per cent. of young calves were infected, the common belief that calves less than 6 weeks old need not be inspected for *Cysticercus* had to be drastically revised. The age and sex of the cattle are discussed in relation to incidence: of the 358, 298 were males, but the author points out that it is mostly male beasts which have so far reached the slaughter bay at Athi. Of the 358 infected cattle there were 248 which were 5 or 6 years old. Evidently many beasts became clear of cysticercosis as they grew older, which the author inclines to attribute to degeneration of the infection and transfer to a clean pasture, rather than to acquired resistance from repeated infection.

The sites of predilection, routine meat inspection and legislation, are discussed, and there is a brief reference to immunization. Mass serological diagnostic tests of cattle would not be feasible at Athi.

The author stresses the public health and economic seriousness of *Taenia* infection, especially in a country with an increasingly important meat industry. He urges the need for a well-established meat inspection service and for a campaign to "clean up" the infection. A start has been made by his headquarters, which reports all infections to the Directors of Veterinary and of Medical Services, who in turn inform their officers who visit the farms and take the necessary steps.

The paper ends with suggestions for the planning of a campaign. These include the examination for *Taenia* of contacts with cattle and pigs, education of the public, advice and assistance to stockbreeders, compulsory construction of latrines, free medical treatment of infected persons, collaboration with neighbouring territories, more extensive training of African Sanitary Inspectors in meat hygiene, and compulsory meat inspection.

H. J. O'D. Burke-Gaffney

MUSTAKALLIO, K. K. & SAIKKONEN, J. I. **The Distribution of Quinacrine in *Taenia saginata*. *Exper. Parasit.* New York. 1954, Mar., v. 3, No. 2, 167-72, 8 figs.**

"The distribution of quinacrine in six beef tapeworms, *Taenia saginata*, expelled by this drug has been studied with the aid of a fluorescent microscope. The observation that quinacrine possesses a great affinity for the holdfast organs may be of value in explaining the teniafugal action of quinacrine."

ALDRICH, D. V., CHANDLER, A. C. & DAUGHERTY, J. W. **Intermediary Protein Metabolism in Helminths. II. Effect of Host Castration on Amino Acid Metabolism in *Hymenolepis diminuta*. *Exper. Parasit.* New York. 1954, Mar., v. 3, No. 2, 173-84, 4 figs. [23 refs.]**

"1. Eighteen identified free amino acids and related substances and several unidentified substances were found to occur in the tissues of *H. diminuta*.

"2. Four transaminase systems were found to operate at a measurable rate above that of control values: alanine \longrightarrow glutamate, aspartate \longrightarrow glutamate, glutamate \longrightarrow alanine, and glutamate \longrightarrow aspartate.

"3. Castration of the host markedly reduced the rate of activity of the transaminase systems in *H. diminuta*. Associated with this was an increased deposition of fat in the worm.

"4. The significance of transaminase and the effect of castration are discussed in relation to protein synthesis and utilization."

See also p. 828, CHERNIN, **Problems in Tropical Public Health among Workers at a Jute Mill near Calcutta. IV. Hemoglobin Values and their relation to the Intensity of Hookworm Infections in the Labor Force.**

NODA, N. [**Intradermic Reaction of Ancylostomiasis**] *J. Osaka City Med. Center.* 1953, Apr. 1, v. 2, No. 3, 202-13. [32 refs.] [In Japanese.] English summary 241-2.

The English summary appended to the paper is as follows:—

“The extract of encysted larvae of a hookworm (*Ancylostoma duodenale* Dubini) was prepared by the method of Matsubara's cancer reaction. The extract, which is considered polysaccharide, was injected intracutaneously into the flexor of the forearm of the patient with *Ancylostoma duodenale* and of the normal subject. After the injection the breadth of the reddishness became maximum in 20-30 minutes revealing no difference between the two.

“Using the same extracting method, the author extracted polysaccharide of the above extract, 0.2 cc of the extract, which corresponds to 0.25 of the worm, showing the most marked difference between the patient and the normal subject (i.e. the best condition for diagnosis). The highest positive rate, was observed at 30 min. and the breadth of the reddishness was over 30 mm for most of the patients, while it was less than 20 mm for the control.

“The test using the extract was tried for 115 patients and 117 normal subjects and 81.7% of the patients showed positive results. Mass examination was carried out twice resulting in a positive rate of 70.6% and 80.0% respectively. The degree of positivity thus obtained was found indifferent of the numbers of eggs and worms. This test revealed that the patients examined maintained a positive value for over 1 year after the anthelmintic treatment.”

ELMES, B. G. T. & MCADAM, I. W. J. **Helminthic Abscess, a Surgical Complication of Oesophagostomes and Hookworms.** *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 1-7.

During the past 3 years, 3 cases have occurred in the Mulago Hospital, Kampala, in which oesophagostomes and hookworms have penetrated the mucosa of the bowel, giving rise to serious surgical complications.

Case 1 was that of a European female, aged 5. There was a history of fever and epigastric pain for 9 days and of diarrhoea for 3 days; acute right-sided pain then developed and on admission to hospital a tender mass was found to the right of the umbilicus and $1\frac{1}{2}$ inches above McBurney's point. The white cell count was 8,500 per cmm. and X-ray examination showed a gas-distended colon displaced laterally by a mass in the ileocaecal angle; the appendix filled normally. At operation 2 weeks later the mass was found to involve the caecum, ascending colon and terminal ileum, with a loop of jejunum incorporated in its wall. Incision into the mass opened a cavity containing pus, from which a live worm escaped. The loop of adherent jejunum, measuring 4 inches, was resected with end-to-end anastomosis. A right hemicolectomy was performed, with end-to-side ileo-transverse colostomy. Recovery was uneventful. Histological examination of the tumour tissue showed fatty-fibrous tissue infiltrated with eosinophile leucocytes and a necrotic area, bounded by granulation tissue, containing many pus cells. The worm was identified provisionally as *Oesophagostomum stephanostomum*.

Case 2 was that of a European male, aged 31. Central abdominal pain of increasing severity, spreading to the whole abdomen had been present for 20 hours only. On admission there was generalized abdominal tenderness and muscle guarding. At laparotomy general peritonitis was found to be present, with an indurated mass in the middle of the transverse colon connected by a sinus with a subperitoneal abscess cavity; there were 2 similar but smaller masses at the hepatic and splenic flexures. The perforated part of the transverse colon was resected and a colostomy was established, which was closed 2 months later after intensive antibiotic treatment. The mass was found to contain an abscess cavity, with walls consisting of granulation tissue densely infiltrated with eosinophiles and containing a nematode worm, identified as *Oesophagostomum apiostomum* or *O. brumpti*.

Case 3 was that of an African male, aged 50, who presented himself with a 9-day history of abdominal pain. There was a sausage-shaped mass extending across the epigastrium, with a large, hard, irregular tumour at its right extremity. At laparotomy a chronic ileocaecal intussusception was found, in addition to a tumour resembling a carcinoma in the wall of the transverse colon. As it was impossible to reduce the intussusception, a right hemicolectomy was performed. Convalescence was uneventful. The pathological findings were the same as in the other cases, the nodule in the colon containing an abscess cavity in which was a female *Ancylostoma duodenale*.

Two other cases are described which were operated upon for appendix abscess, and masses of similar character to those described above were found in the wall of the caecum, but no worms were found in these cases. Another case is described in which an oesophagostome was found in the pus from an abdominal abscess in an African child, aged 4.

The parasitology of *Oesophagostomum*, which ordinarily infests apes and monkeys, and in Uganda is said to be fairly common in sheep, is briefly discussed. Invasion of the wall of the small intestine by *A. duodenale* was described by BONNE [this *Bulletin*, 1938, v. 35, 277; 1943, v. 40, 325] in Malays and Chinese in Java. Instances in which worms have been found at autopsy imbedded in the mucosa have been met with in Kampala. In Cases 1 and 2 worms were found which are known to penetrate the bowel wall and produce nodules, but the finding of *A. duodenale*, as in Case 3, must be very rare. The author, after discussing the clinical findings rejects the possibility that the worm and the mass were not causally related. These 5 patients are not the only ones who, in the past 5 years, have been suspected at operation of suffering from this condition; there were 5 other cases in which it was considered inadvisable to do a biopsy or perform resection for various reasons.

W. L. Harnett

GOLDBLOOM, A. A. & BOYD, L. J. **Tetrachlorethylene Fatality. Case Report of a Patient with Infectious (Virus) Hepatitis and Hookworm Infestation.** *Indust. Med. & Surgery*. Chicago. 1954, Mar., v. 23, No. 3, 116-19. [16 refs.]

The authors refer to the various industrial uses of tetrachlorethylene and call attention to the need for care when it is used as an anthelmintic. They report the death of a Puerto Rican, aged 27, who was given 3 cc. of tetrachlorethylene for non-symptomatic hookworm infection when he was also suffering from infectious (virus) hepatitis.

The patient had yellow discolouration of the skin and sclerae and enlargement of the liver, but not of the spleen. The rectal contents were light-coloured. Fever was absent, but anorexia, postprandial discomfort, loss of appetite, malaise and jaundice increased and marked itching developed.

Improvement followed the administration of small doses of insulin, with a high protein and carbohydrate diet, vitamins, crude liver extract and rest in bed.

Hookworm eggs were found in the stools and "inadvertently" 3 cc. of tetrachlorethylene were given with magnesium sulphate. Early the same evening the patient vomited brownish material mixed with blood and became prostrated, restless and weak, with a fall of blood pressure and tachycardia. Six hours later there were frequent bloody stools with abdominal cramps.

In spite of treatment the patient died 2 days after the tetrachlorethylene had been given.

The authors discuss the properties of tetrachlorethylene and its fatal effects on animals, and the data on which the diagnosis of infectious (virus) hepatitis was based. Discussing the literature on tetrachlorethylene, they point out that it has been given in several hundred thousand cases with few reports of serious intoxication. References are given to reports of effects similar to those here described. The authors concluded that, in the case they report, the damage already done to the liver by the hepatitis precipitated the rapid death of the patient. This case shows that tetrachlorethylene must not be given to patients with damaged livers. Hepatic functional tests should be done before any of the hydrocarbons are given and some abnormal liver functional tests may be encountered in anicteric hepatitis. Precautions are essential when tetrachlorethylene is used as an anthelmintic, and when it is handled in industry.

G. Lapage

BEKIUS, H. J. *Ascaris-infectie bij het kind*. [**Ascaris Infection in Children**] *Nederl. Tijdschr. v. Geneesk.* 1954, May 1, v. 98 (ii), No. 18, 1208-12.

The English summary appended to the paper is as follows:—

"After a short description of the life cycle of *Ascaris lumbricoides*, mention is made of the most important pathological conditions caused by ascaris infection in children. Changes in the lungs especially are noteworthy.

"Ascaris infections are most common in poor country districts, where gardens are often manured with human excreta. Ascariasis is rarely found in the city of Groningen. Velardon, an ascaricide preparation (made by N. V. Organon) containing papain, was tried on 60 children."

TAKAHASHI, T. [**Studies on the Experimental Hatching of *Ascaris* Eggs**] *J. Osaka City Med. Center.* 1953, Jan. 1, v. 2, No. 2, 122-4. [11 refs.] [In Japanese.] English summary 155.

The English summary appended to the paper is as follows:—

"By the elaborate experiments of many previous authors, it is confirmed that the matured ascaris eggs hatch out in the small intestine of the feeding animals. But the action of gastric juice upon the hatching eggs is still unknown. Two sets of experiments, therefore, were carried out by the author in order to confirm the influence of the gastric juice upon the hatching process of ascaris eggs, as well as to investigate the hatching variation in two different parts of the alimental tract, such as in the upper or lower part of the small intestine, in the caecum and in the large intestine of the ingested animals. In these experiments, the mice of about 15 gram body weight and the fully matured uterus eggs cultivated about 50 days at 27°C, were used. The results of the experiments are summarized as follows:—

"A. The results of the feeding experiments in which each mouse was fed with about 1000 eggs. (1) No hatching embryo was found in the stomach.

(2) In the upper part of small intestine, the greatest number of embryos were found after 2 hours and no embryo after 9 hours. (3) In the lower part, the greatest after 9 h. and next after 2 h., no embryo after 12 h. (4) In the caecum and large intestine, most abundant after 9 h. (5) No embryo was found in all parts after 12 hours. These results are quite the same as the results reported by others.

"B. The results of the injection experiments in which the alimental canal was tied firmly at the upper end of the small intestine and at the lower end of the large intestine and the eggs were injected into the duodenal part to keep the eggs uninfluenced by the gastric juice. (1) In the upper part of the small intestine, embryos were found most abundant after 1 hour. (2) In the middle part, most numerous after 4 h., and next after 6 h. (4) In the caecum and the large intestine, most numerous after 9 h. In both sets of experiments, the embryos were most abundantly found in the caecum and in the large intestine after 9 hours. It may be partly caused by the accumulation of embryos which hatch out in various parts of the small intestine and migrate there according as the time lapses. From the results of the above experiments it could be inferred that the ascaris eggs may hatch out without any action of the gastric juice."

KIMURA, E. & OHKUBO, M. [**A New Sugar Flotation Method for separating the Eggs of *Ascaris lumbricoides* from the Faeces**] *J. Osaka City Med. Center.* 1953, Apr. 1, v. 2, No. 3, 236-8, 3 figs. [In Japanese.] English summary 244.

The English summary appended to the paper is as follows:—

"The eggs of *Ascaris lumbricoides* are separated completely from the feces by means of a new sugar flotation method.

"The process involved in this method is as follows:

"(1) Four sugar solutions whose specific gravities being 1.250, 1.200, 1.150, 1.120 respectively, are prepared from the saturated cane sugar solution.

"(2) A lump of fresh feces weighing about 2 gr. is crushed in 5 c.c. of sugar solution whose sp.gr. is 1.250, filtrated with a gauze and then poured into a centrifuge tube. For the dried feces, the sugar solution of sp.gr. 1.200 is convenient and the result is better than the fresh feces.

"(3) Four liquid layers are prepared in a centrifuge tube. The bottom layer consists of sugar solution containing the crushed feces, the second and third layers contain sugar solutions whose sp.gr. are 1.150 and 1.120 respectively. The top layer consists of distilled water. The thickness of the three layers from the top must be about 1 cm. In order to place one layer upon the other, liquids must be poured quietly along the inner wall of the centrifuge tube in turn with a pipette.

"(4) Centrifuge at 3000-4000 rpm for 20-15 min.

"(5) Nearly all eggs of ascaris of the testing feces collect at the boundary between the second and third layers whose sp.gr. 1.150 and 1.120 respectively and form a thin stratum. The heavier particles of feces sink to the bottom and lighter particles float at the boundary between the distilled water and the sugar solution. The eggs of ascaris can be obtained separately by pipetting off their stratum.

"(6) The pipetted solution containing the eggs of ascaris is poured into a centrifuge tube containing distilled water and centrifuged at 3000 rpm for about 10 min. The eggs sink to the bottom completely and can be obtained in a pure state by decanting the supernatant fluid."

ESPEDOS, R. Ascaridiosis hepática y de las vías biliares. Estudio de cinco casos anatómicos. [Anatomo-Clinical Study of 5 Cases of Ascariasis of the Liver and Biliary Passages] *Rev. Biología Trop.* San José, Costa Rica. 1953, Dec., v. 1, No. 2, 197-221, 12 figs. on 5 pls. [22 refs.] English summary.

EAST AFRICA HIGH COMMISSION. **Filariasis Research Unit Annual Report No. 4, 1952** [LAURIE, W., Director]. 39 pp. [20 refs.] 1953. Nairobi: High Commission Printer.

The first part of this report describes surveys of filariasis in Tanganyika territory. In the Southern Highlands Province, bancroftian filariasis is mostly rare apart from certain foci. Around the northern end of Lake Nyasa it is quite common, occurring chiefly within 16 miles of the lake. Onchocerciasis is rare, being present mostly as a small focus around Njombe.

In the Southern Province, bancroftian filariasis is very prevalent along the coast and along the river valleys, the microfilarial rate among adult males being 20-70 per cent. Inland, in the drier and higher areas, it becomes rare. In general a high incidence is found when a high temperature is combined with high relative humidity. *Dipetalonema perstans* was somewhat rarer. Microfilariae of *D. perstans* and *W. bancrofti* were both found in an infant estimated to be 8 months old, and also in other children not much older. Elephantiasis is uncommon and is relatively unimportant to the Africans in these parts; but hydrocele may affect 30 per cent. of the adult males in some villages.

In primitive districts such as these it is often difficult to collect night blood films for surveys. But the use of filarial antigens for skin tests (as an alternative method) has proved disappointing.

In East Africa the economic importance of the disease lies in the crippling effects of genital filariasis and (less important) of elephantiasis. These cause periodic attacks of pain and the loss of many working days.

Therapeutic trials have been carried out with various drugs. In one area, 125 adults were treated with diethylcarbamazine, more than 70 mgm./kgm. body weight, in August 1950. In another area 131 were similarly treated in October 1951. Up to January 1953 none of these had developed hydrocele or elephantiasis. It is expected that over the years about 20 cases of elephantiasis and 20 cases of hydrocele would occur among 256 such persons if untreated. This interesting and important investigation has not yet continued long enough for conclusions to be drawn. One hundred patients with elephantiasis of the legs, who had been treated 2 years ago, have been followed since. Although there has been no significant reduction in size of the limbs, the patients have been free from the recurrent attacks of fever and pain, and at least half of the patients have been relieved of all symptoms. It is considered therefore "that hetrazan is of value when administered to individuals suffering from bancroftian elephantiasis". One case of elephantiasis of the legs has been seen $2\frac{1}{2}$ years after treatment in which the elephantoid condition seems to have completely disappeared. Fifty-four patients with uncomplicated hydrocele have been treated, and 17 were observed over one year later; in 8 patients (with small or moderate hydroceles) the condition was cured completely, in 7 there was no change, in one there was improvement, and in one the hydrocele was worse. Four of the 9 patients not cured reported disappearance of the crippling attacks of pain and fever. Thirteen patients with elephantiasis of the scrotum were treated and followed for over one year; no regression of the skin lesions was observed, but half the patients reported freedom from pain and fever. [This is a careful and valuable investigation of the permanent effects of treatment with diethylcarbamazine.]

Other patients were treated with Protostib (N-methyl glucamine anti-moniato) by intravenous or intramuscular injection. As described in previous reports [this *Bulletin*, 1953, v. 50, 45], it may cause exfoliative dermatitis and the injections are painful; it is not recommended for field use. One hundred and ten patients were treated 18 months earlier and followed up; none has yet developed hydrocele or elephantiasis [*cf.* above]. In 115 patients treated with over 200 mgm. Sb per kgm. 18 months earlier, the total count of microfilariae had fallen by 91 per cent.; this dose is near the toxic level, but although it kills many of the adult worms, it does not remove them all. Fifty-six patients with elephantiasis were treated with Protostib, and 39 were observed 12 months later; in none was there any change of size, but in 28 the pain and fever were greatly diminished. Similar results were observed in 17 patients treated for hydrocele. In general, Protostib caused improvement in some of the symptoms of filariasis, but such improvement could be obtained more safely and simply with diethylcarbamazine.

Investigations were also made with arsenamide [$\text{H}_2\text{N.CO.C}_6\text{H}_5.\text{As. (S.CH.COOH)}_2$] given intravenously as 0.2 mgm. arsenic per kgm. daily for 15 days. One patient developed jaundice a few days after the treatment finished. [One patient in the series treated by McFADZEAN and HAWKING (this *Bulletin*, 1954, v. 51, 708) developed acute and fatal liver necrosis after 3 doses of this drug.] In 4 patients observed 12 months later the microfilarial count had been reduced to small figures. The results with hydrocele and elephantiasis are similar to those described for diethylcarbamazine above. Although the numbers observed are small, it is considered that arsenamide is probably not capable of doing anything which cannot be done more easily and safely with diethylcarbamazine.

As regards transmission, mosquitoes were caught on Ukara Island and dissected; 0.4 per cent. *Anopheles gambiae* contained infective forms, and so did 1.0 per cent. *A. funestus*. *A. pharoensis* contained developmental forms in 12 per cent. of the individuals but this mosquito was relatively uncommon. *Taeniorhynchus africanus* and *T. uniformis* contained no infective forms. *A. gambiae* and *A. funestus* are the commonest mosquitoes which bite indoors at night; they also feed chiefly on man, as was shown by precipitation tests of their stomach contents. Accordingly it is concluded that these 2 species are important vectors of *W. bancrofti* on Ukara Island, and that *A. pharoensis* may be a minor vector. Culicines are probably unimportant.

The third section of the report deals with onchocerciasis. In addition to the results reported in Tanganyika [above] surveys have started or are about to start in Kenya and Uganda. Preliminary observations are reported, together with some results of treatment with the drugs referred to above.

F. Hawking

JORDAN, P. **Bancroftial Microfilaraemia in Hospital In-Patients.** *J. Trop. Med. & Hyg.* 1954, Jan., v. 57, No. 1, 8-12.

In an attempt to elucidate the early stages of infection with *Wuchereria bancrofti* the incidence of microfilaraemia was observed in all patients admitted to Mwanza Government Hospital, Tanganyika. On analysing the findings, which are reported in detail, it was found that there was a much higher rate of infection in patients suffering from tropical ulcers and traumatic disease than in those suffering from non-traumatic disease. The possibility that this was due to selection was considered, traumatic cases coming mainly

from Mwanza District, where it is known that filariasis is more prevalent than in outlying districts served by the hospital. Accordingly an analysis was made of patients from Mwanza District only, but when this and age distribution were taken into account, the higher rate was shown still to be present. The incidence of microfilaraemia was also higher in non-febrile than in febrile patients and it is suggested that recurrent fever associated with malaria militates against microfilaraemia [see Mcgregor and Smith, this *Bulletin*, 1953, v. 50, 57].

It is also suggested that tissue damage and shock possibly bring about the liberation of a substance which acts on microfilariae in the lungs and causes them to migrate into the peripheral circulation, or acts on the uterus of adult female *W. bancrofti* causing it to contract and expel microfilariae into the circulating blood. It is reported that recurrent attacks of severe filarial lymphadenitis are apparently not encountered in East Africa, though mild attacks occur.

[The association of microfilaraemia with trauma is an interesting and important observation. It may well open up a new field of research into the part played by histamine-like substances in filariasis. The paper forms a valuable contribution to knowledge of the disease.] A. W. Woodruff

BOITHIAS, R. & BRUMPT, V. Note sur le diagnostic parasitologique de l'onchocercose oculaire en clinique et au laboratoire. [**Note on the Parasitological Diagnosis of Ocular Onchocerciasis in the Clinic and the Laboratory**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 967-71.

The authors suggest that as a result of their observations in several hundred cases, it is often possible to make the diagnosis of onchocerciasis by ocular biomicroscopy, which may reveal the microfilaria in the cornea, the aqueous humour, and more rarely in the vitreous. The slit-lamp observation was frequently confirmed by anterior chamber puncture, which revealed the microfilaria of *Onchocerca volvulus*. These tests were often positive where cutaneous biopsies were negative.

D. P. Choyce

GARNHAM, P. C. C. & McMAHON, J. P. **Final Results of an Experiment on the Control of Onchocerciasis by Eradication of the Vector.** *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 175-6.

Simulium neavei was eradicated in 1946 from Koderia district in Kenya by antilarval treatment of the river systems with DDT [this *Bulletin*, 1947, v. 44, 1084]. Microfilarial rates for *O. volvulus* in skin snips at this time were 7 per cent. in the 3-4-year-old children, 37 per cent. in the 4-8-year-old group, and surveys of adults had previously ranged from 70 to 85 per cent. infected. Yearly surveys for *S. damnosum* after the eliminating treatment of the rivers in 1946 failed to reveal any flies in the next 8 years, despite rewards of 5 shillings offered for any fly found, and intensive observation by European and trained African staff. No larvae or pupae were found on 1,200 crabs examined from Koderia rivers in 1950. There is no reasonable doubt that eradication has been complete. A table shows the percentage of persons in age groups 0-3 years, 4-8 years, 9-12 years, and adults positive for microfilariae in surveys made in 1950 and 1953, and the text adds data from a further survey in September 1953. In these surveys, no infection was found in children under 3 years of age, 5 per cent. in the 4-8-year group, 20 to 28.6 per cent. in the 9-12-year group, and 35.5 to 50.3 per cent. in adults. In the September survey no positive skins were obtained in 129

children up to 7 years of age. The positives (6 in 120 children) among the 4-8-year group in the earlier survey of 1953 are likely to be due to under-estimations of the age of the children.

It is concluded that microfilariae in this infection are still being produced 7 years after the last exposure to infection, although about one-third of the infections in adults died out within the same time. Clinically, material improvement was apparent within 4 years. Thus, skin lesions dropped from 15 to 3.3 per cent., nodules from 4.7 to 0.5 per cent., and ocular changes from 9.8 to 0.5 per cent. Thus, although transmission has ceased, the disease lingers on in some persons, and dramatic results as in malaria eradication are not evident.

D. S. Bertram

McQUOWN, A. L. *Capillaria hepatica*. *Amer. J. Clin. Path.* 1954, Apr., v. 24, No. 4, 448-52, 7 figs. [10 refs.]

"The second spurious finding of *Capillaria hepatica* in the United States and the Northern Hemisphere is presented. This is the third incidence reported from the same area.

"*Capillaria hepatica* infection has been found in the red or fox squirrel (*Sciurus niger*).

"Criteria for diagnosis are given."

SEMPLE, A. B., DAVIES, J. B. M., KERSHAW, W. E. & ST. HILL, C. A.
An Outbreak of Trichinosis in Liverpool in 1953. *Brit. Med. J.* 1954, May 1, 1002-6, 2 text figs. & 6 figs. on pl.

The authors' summary is as follows:—"An outbreak of trichinosis is described which occurred in Liverpool in the late autumn of 1953 and involved 82 persons.

"Infection was traced to sausages in most cases. In two instances pork roasted at home was responsible. Although epidemiological investigation traced the infection to a particular carcass of pork, it was impossible to trace this finding back to a piggery, as no records existed to enable this to be done. There is an obvious need for such records to be kept by the Ministry of Food.

"Women were affected more often than men (60 to 22). Analysis of the eating habits of 3,412 housewives in Liverpool showed that 16.1% habitually ate raw sausage.

"The symptomatology of 82 cases is considered in detail. Oedema of eyelids, headache, muscular pains, pyrexia, photophobia, and insomnia were the most commonly reported signs and symptoms.

"A fatal case is recorded, together with the post-mortem findings. The complication of myocarditis developing in the second and third weeks of disease is considered, and it is emphasized that any suggestion of cardiac involvement should be treated seriously and the patient nursed in a recumbent position, as there is a possibility of sudden death.

"Larvae were isolated from the muscles of 16 patients."

In a leading article published in the same number of the *British Medical Journal* (p. 1025), attention is drawn to the fact that although trichinosis is a comparatively rare disease of man in Britain, nevertheless infection of animals with the causative organism (*T. spiralis*) is by no means uncommon; thus, YOUNG [this *Bulletin*, 1948, v. 45, 355] reported that examinations of 472 human diaphragms collected at autopsies made in various towns in England and Wales revealed an average infection rate of nearly 11 per cent. Since such infections are only acquired through the ingestion of pork, it is

lamentable that our present system does not allow the tracing of infected animals, and it is suggested that this matter deserves the serious attention of the Ministry of Health and Agriculture. [If the proposal to treble the number of abattoirs in Britain, referred to in *The Times* of May 12th, is agreed to and comes into force, the problem of tracing pigs infected with *T. spiralis* and cattle with *Cysticercus bovis* will be rendered even more difficult.]

R. M. Gordon

ROETT, Catherine J. E., FREEMAN, Lelabelle C. & SCOTT, R. B. **Incidence of "Subclinical" Trichinosis in Children. Observations based on Reaction to Intradermal Test with *Trichinella* Antigen.** *Amer. J. Dis. Children.* 1954, Apr., v. 87, No. 4, 464-7. [15 refs.]

"Intradermal tests for trichinosis were performed on 358 children ranging in age from 1 to 13 years. Six of the 358 children tested (1.67%) exhibited a positive skin reaction. A definite history of pork ingestion was obtained in each positive reactor. None of the positive reactors had signs of clinically active trichinosis and were regarded as persons who had experienced a sub-clinical infection at some time in the past."

DEFICIENCY DISEASES

KARK, Emily. **The Growth and Nutritional State of Bantu Girls in Durban.** *South African J. Med. Sci.* 1953, Dec., v. 18, Nos. 3/4, 109-24. [21 refs.]

This is a very careful study of a group of Bantu girls. Physical measurements showed a physique a little below that of European girls in South Africa, but much superior to sections of the Bantu community previously studied. Frank deficiency disease was not seen, but dental caries was common and a quarter of the girls had postural defects. The skin was examined very systematically and in few girls was entirely healthy. Minor infections and degenerations, perhaps ascribable to poor nutrition, were the rule. The changes are described in great detail.

In a feeding experiment one group receive half a pint of milk every school day for a year. A control group received an isocaloric amount of a syrup. Both groups gained in weight and nutritional status improved, but equally so. The expected differential improvement with the milk was not found. The reasons for this are discussed.

[This is an important study of the normal levels of health of Bantu children. Basic information is provided in detail, which should be valuable to all who work among the Bantu.]

R. Passmore

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. Report No. 193. Rapport au gouvernement italien chargé de l'administration du territoire sous tutelle de la Somalie sur les résultats de l'enquête préliminaire sur l'état de nutrition de la population de ce territoire. [Report to the Italian Government charged with the Administration of the Territory under the Protectorate of Somaliland on the Results of a Preliminary Enquiry on the State of Nutrition of the Population of this Territory] [FERRO-LUZZI, G.]. 40 mimeographed pp. [18 refs.] Rome: 1954, Jan.

About 70 per cent. of the Somalis are pastoral nomads living in a hot and semi-arid country. Camels, sheep, goats and cattle are kept in large

numbers, but tradition determines that quantity is considered before quality and numbers mean prestige, which counts more than nutritional or economic value. Milk is the staple food and sometimes the population is drinking up to 4 litres per head per day. But there is no dairy industry and no means of preserving surpluses. Every year there is a dry season lasting several months, during which there is always an insufficiency of calories and not infrequently this amounts to a real famine. There is a small population of cultivators, who grow mostly sorghum and maize by poor methods with inferior seed. A small industrial population and a few fishing communities on the coast make up the whole population.

A clinical examination was made of over 3,000 persons in various parts of the country. Two-thirds of these were considered to have good nutrition, one-third poor and one per cent. bad. Anaemia was recorded in 15 per cent. and 25 per cent. manifested phrynoderma and "mosaic skin", attributed to lack of vitamin A and the B group of vitamins. Scurvy was the only frank deficiency disease seen: 21 cases were found in one district. No kwashiorkor was seen, owing no doubt to the usually liberal supply of milk. Mixed feeding of infants starts often from birth, but the hygiene of infant feeding is deplorable. Heights and weights are recorded of samples of the population, which should be a usual reference.

The author recommends an effort to increase the cultivation of millet and maize. Potatoes and manioc are suggested as possible new alternative sources of calories, especially in the dry season. A study of practical methods of preserving milk and milk products is an urgent necessity. Agriculture and nutrition are both handicapped by much ignorance and taboos and superstitions. Education is needed, including instruction in hygiene in schools. Instruction in germination of cereals to provide an adequate source of vitamin C, where scurvy is endemic, is necessary. A study of the quantity and quality of the milk of Somali women is recommended. The setting up of a Nutrition Council to study the various problems and coordinate the necessary work is recommended.

[This is a concise and readable report. The many problems are set out with clarity, and practical solutions are offered. The author visited the country for 3 months on behalf of FAO, assisted by UN Technical Assistance Funds. Somaliland is now administered by the Italian Government on behalf of the United Nations. The total population is only one and a quarter million. This report has stated the principal problems of the Somalis clearly. Together Italy and UN should be able to produce some of the solutions.]

R. Passmore

MURAI, Mary. **Nutrition Study in Micronesia.** *Atoll Res. Bull.* Wash. 1954, Jan. 31, No. 27, v + 239 mimeographed pp. [25 refs.]

All of us since early childhood have been fascinated by the coral islands of the Pacific. We should like to know more about those who live in these fantastically beautiful surroundings. Miss Murai has spent several months studying the dietary habits of the people on the Marshall Islands and on the Eastern Caroline Islands and the reviewer took up her report with pleasurable anticipation. There was a disappointment on page 1. "Two islands were selected for which some medical, anthropological or other pertinent observations had been reported under the CIMA or SIM programs". As the reviewer has to confess to never having heard of CIMA or SIM, and is quite unfamiliar with their reports, it was distressing to learn that we were going to be told no more about these subjects which they had studied. It has at last become generally realized that the science of nutrition is

intimately linked with that of social anthropology, especially among primitive people. To read a nutrition report with no account of the general life of the people is both dull and unprofitable.

Miss Murai then tells us how she set about her work: first she made a serious study of 2 languages and learnt enough at least to be able to hold simple conversations on the subject of food. She records a good vocabulary of the English and local names of the foods eaten. However, in each village she had to employ an interpreter. "He was a local person . . . familiar with the cooking and eating customs of the community. This was necessary to detect any deviation from normal. . . . As he was a local person, he was trusted . . . and received a greater degree of co-operation from the group." Miss Murai appears to have relied implicitly on the judgment and integrity of her interpreters. Maybe she was right, but if so interpreters on the Atoll Islands differ from interpreters in every other part of the world. With the help of gifts to local chiefs and kings she won the confidence of the people. Then she walked many miles a day visiting the homes of the people. "Villages were separate units and as Udot was a 'high' volcanic island, to get from one village to another was difficult as trails went up and down hills. . . . Many of the paths were overgrown with grass and foliage. . . . Homes were scattered in the hills. After rainfall, roads were washed out . . . it was dangerous to try and climb the hill paths so the lagoon paths along the boulders were used in most cases." On arrival at the home she managed with the aid of her interpreter to persuade the people to keep "informal records" of how much each individual ate for a 7-day period. These were "recorded" in household measurements of foods, such as a serving of rice in an enamel dish, cocoanut shell or messkit: a roasted breadfruit, half of a breadfruit, heaped tablespoon of sugar and other food items. So far so good: Miss Murai could have returned home and written in simple English an interesting and valuable report of what she saw the people eating. Instead she gets out food tables and a calculating machine and turns it all into biochemical jargon. Pages and pages of the report are in the following style: "Thiamine. For six female subjects, 13 to 15 years of age, the range was 767 to 1822 mgs. and the average per person was 1450 mgs. The average was 111% of the NRC allowance of 1300 mgs. One subject or 17% was below the allowance and five subjects or 83% were above the allowances." It is often necessary to record basic measurements of weight in units of cocoanut shells. Properly interpreted such data can be valuable. But to calculate the sum of the contents of a number of cocoanut shells to 4 significant figures of one thousandth of a milligramme is a dubious activity. There are pages and pages of such absurdities in this report.

Miss Murai is clearly an energetic field worker with initiative and drive. She is not afraid either of hard physical work or of discomfort. She has obviously collected much information that could be set out in an entertaining, yet concise and valuable report. The present report is for the most part dull and unreadable. It is sponsored by the Pacific Science Board, the National Academy of Sciences and the National Research Council, whose names appear on the front page. It is these distinguished bodies, not the active field worker, who should be held responsible for the poor presentation of her results, which in reality must surely be interesting. *R. Passmore*

SPENA, A. Les parasites et la nutrition. [**Parasites and Nutrition**] *Riv. Italiana d'Igiene*. 1953, Nov.-Dec., v. 13, Nos. 11/12, 433-59. [16 refs.]

This is the text of a lecture given in an international course on nutrition organized by FAO, WHO and the French Government. As the author

charmingly says, it is a modest exposition without pretensions. For the most part it deals well with the general principles of host-parasite relations with special attention to the bacteria and the other parasites of the alimentary tract. The problems are well set out, but toxæmia resulting from absorption of the products of intestinal putrefaction receives much more attention than is usual today—at least in England. For the reader the paper loses much of its value, because the numerous authorities quoted in the text and the bibliography at the end have little in common.

P. Passmore

LUGG, J. W. H. & ELLIS, F. P. **Some Water-Soluble Vitamins in the Sweat of Tropically Acclimatized European Men.** *Brit. J. Nutrition.* 1954, v. 8, No. 1, 71-7. [19 refs.]

Samples of arm sweat obtained from acclimatized men exercising in oppressively warm conditions contained ascorbic acid nil, dehydroascorbic acid 0.02 mgm. and thiamine 0.123 (mean values per 100 ml. of sweat). On reviewing this result and the literature, the authors conclude that it is unnecessary to supplement ascorbic acid or thiamine intake to offset losses in sweat.

R. Passmore

PLATT, B. S. & FOX, R. H. **Planning Food Supplies for Tropical Expeditions.** *Proc. Nutrition Soc.* 1954, v. 13, No. 1, 53-60. [26 refs.]

This review indicates that the 2 most important factors on tropical expeditions are a sufficiency of water to meet the extra losses in sweat and a variety of appetizing menus. Loss of appetite may undermine rapidly the health of men in the tropics and their capacity for physical exertion. Skill is needed in the preparation and serving of processed and dehydrated foods, if meals are to be attractive. A skilled cook and strict discipline about regular meal-times are essential for tropical expeditions.

Care should always be paid to 2 simple criteria of adequate nutrition—a urinary output of not less than 2 pints each day and the maintenance of body weight.

R. Passmore

- i. SUBRAHMANYAN, V., MURTHY, H. B. N. & SWAMINATHAN, M. **Effects of Partial Replacement of Rice, Wheat or Ragi (*Eleusine coracana*) by Tuber Flours on the Nutritive Value of Poor Vegetarian Diets.** *Brit. J. Nutrition.* 1954, v. 8, No. 1, 1-10. [12 refs.]
- ii. MURTHY, H. B. N., SWAMINATHAN, M. & SUBRAHMANYAN, V. **Effects of Partial Replacement of Rice in a Rice Diet by Tapioca Flour on the Metabolism of Nitrogen, Calcium and Phosphorus in Adult Human Beings.** *Ibid.*, 11-16. [12 refs.]
- iii. REDDY, S. K., DORAISWAMY, T. R., SANKARAN, A. N., SWAMINATHAN, M. & SUBRAHMANYAN, V. **Effects on the General Health and Nutritional Status of Children of Partial Replacement of Rice in a Poor Vegetarian Diet by Tapioca Flour.** *Ibid.*, 17-21.

i. The failure of agriculture to increase cereal production at a rate as fast as population growth in India and other parts of Asia has led to the present shortage of cereals. The nutritive value of other foodstuffs, notably tubers, which may be possible and acceptable alternatives to cereals in national dietaries, is therefore an important practical problem. Insufficient rice is available for the needs of the people of India. In parts of the south

tapioca is already an important subsidiary food. To what extent can tapioca make good a shortage of rice? This is the essential question which these 3 papers set out to answer.

The first paper deals with the partial substitution of cereals by tapioca in human vegetarian diets, given to rats. If 80 per cent. of the diet was composed of rice, a substitution of 25 per cent. with tapioca caused a distinct improvement in the growth of rats. When the animals were given the diets *ad lib.* the substitution of tapioca did not affect nitrogen retention, and calcium retention was increased. The data given below, based on the authors' table No. 14, show elegantly how, for the rats at least, a mixed rice and tapioca diet is superior to diets containing only one of these foods.

| Diet | | Protein | Food intake | Weekly |
|--------|-----------|-------------|-------------|----------------|
| Rice % | Tapioca % | % (dry wt.) | gm. dry wt. | wt. gain (gm.) |
| 79 | 0 | 8.3 | 7.1 | 3.7 |
| 59 | 20 | 7.1 | 8.5 | 6.1 |
| 39 | 39 | 5.9 | 9.4 | 5.2 |
| 26 | 52 | 4.8 | 8.2 | 3.2 |
| 0 | 79 | 3.3 | (rats died) | |

ii. The second paper reports a balance experiment on 6 young men, lasting 24 days, in which a similar partial substitution was effected. The control diet contained 680 gm. of rice. Substituting 150 gm. with 183 gm. of tapioca increased nitrogen retention slightly and calcium and phosphorus retention more so. The relevant figures for nitrogen are:—

| Diet | | N ₂ intake (gm.) | Urinary N ₂ (gm.) | Faecal N ₂ (gm.) | N ₂ balance (gm.) |
|--------------|-----|--------------------------------|---------------------------------|--------------------------------|---------------------------------|
| Rice | ... | 9.7 | 4.2 | 2.9 | 2.6 |
| Rice-Tapioca | ... | 8.9 | 3.5 | 2.7 | 2.7 |

The figures show the high nitrogen retentions found in vegetarian diets, despite total intakes which are not high, as judged by the usual standards.

iii. The third paper deals with the effects of a similar substitution over a period of 6 months for girls aged 4 to 12 years resident in an orphanage. No significant differences were found in the health or in the growth rate between the control group and the group in whose diet one-quarter of the rice was replaced by tapioca.

[These well-planned experiments can leave little room for doubt that, in times of shortage of rice, replacements up to 25 per cent. of the usual supply with tapioca will have no deleterious effect on health—possibly minor benefits might be expected. This is a very valuable contribution to India's food problems.]

R. Passmore

HOLEMANS, K. & MARTIN, H. Etude des protéines sériques chez les indigènes du Kwango. [Study of Serum Protein of Africans in Kwango, Belgian Congo] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 675-9. [13 refs.]

The following is a translation of the authors' summary:

Estimations were made of serum proteins (total, albumin, globulin) in 141 Africans in Kwango, from infancy to adult age. Total proteins were found to be within the normal range, but there was a hypoalbuminaemia which increased with age [see also this *Bulletin*, 1946, v. 43, 866; 1950, v. 47, 264].

H. J. O'D. Burke-Gaffney

GELFAND, M. **Kwashiorkor. A Description of a Case in a Breast-Fed Infant.** *South African Med. J.* 1954, Mar. 6, v. 28, No. 10, 185-6. [10 refs.]

The author previously described 2 cases of kwashiorkor in breast-fed infants [this *Bulletin*, 1947, v. 44, 232; 1952, v. 49, 436]. In this paper he describes a male infant aged 15 months, who had been breast fed with some supplementary food in recent months. His mother appeared healthy and insisted that the child took sufficient milk before the onset of the disease. An analysis of her milk showed a protein content of 1.04 per cent. The child became ill, failed to gain weight, developed oedema, became febrile and died 6 days after admission. At post mortem a fatty degeneration of the liver was found.

[The author uses this case-history to support his view that kwashiorkor is more than a simple protein deficiency. There must always be doubt about the exact cause of this disease in individual cases. Here again is one unusual patient in whom the diagnosis might be doubted; the orthodox need not be unduly disturbed.]

R. Passmore

ACHAR, S. T. & BENJAMIN, V. **Observations on Nutritional Dystrophy. (Clinical, Pathological and Biochemical Aspects.)** *Indian J. of Child Health.* 1953, Jan., v. 2, No. 1, 1-15, 11 figs. on 4 pls. [11 refs.]

The authors write from Madras and state clearly that the disease which they describe as nutritional dystrophy is very similar to what is known in Africa as kwashiorkor and in South America as *distrofia policarencial*. In Madras the disease is associated with a greater incidence of manifestations of vitamin A deficiency and a much smaller incidence of the typical hair changes than are usually reported in descriptions from Africa. Both the epidemiology of the disease and the pathological picture differ from that found in infantile biliary cirrhosis [see BIENDE and DEORAS, this *Bulletin*, 1954, v. 51, 716]. Clearly these are 2 separate diseases of the liver affecting children in Madras. Diets rich in protein have been the sheet anchor in treatment, but in severe cases better results have been achieved since this therapy was supplemented by blood transfusion. [This paper also provides a good general picture of the clinical, pathological and biochemical features of the disease; this no doubt will be useful in India. The account is concise and orthodox, but readers of this *Bulletin* will be familiar with the story.]

R. Passmore

THOMSON, Florence A. **Notes on Kwashiorkor in Malaya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, Mar., v. 48, No. 2, 150-52.

Kwashiorkor is reported to be widespread in rural Malaya and corresponds in general with the descriptions from Africa and Indonesia. It would appear to give rise to chronic ill-health rather than acute illness. Milk proteins are the most effective remedies. Education is also important.

R. Passmore

HAEMATOLOGY

CHERNIN, E. **Problems in Tropical Public Health among Workers at a Jute Mill near Calcutta. IV. Hemoglobin Values and their relation to Intensity of Hookworm Infections in the Labor Force.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 338-47, 3 figs. [16 refs.]

This is one of a series of investigations into the health of the employees of Ludlow Mill, 3 of which have already been reviewed [this *Bulletin*, 1954,

v. 51, 644]. The present paper records a study of haemoglobin values in the workers, the supervisors and their servants, and of the effect on them of hookworm infection. The incidence of hookworm infection in the supervisors was 0 per cent., in their servants 48.9 per cent. and in 750 workers 68.7 per cent. Though the incidence was high, the intensity of infection was light, only about 20 per cent. falling within the range in which clinical effects might be expected. The distribution of hookworm species, calculated on 706 worms, was *Necator americanus* 87 per cent. and *Ancylostoma duodenale* 13 per cent.

The workers showed mean haemoglobin values considerably below those of the supervisory staff. Age did not affect the haemoglobin value and there were no significant differences between Muslims and Hindus. Male workers, with a mean haemoglobin of 14.3 ± 1.7 gm. per cent., were mainly in the 14 to 16.5 gm. per cent. group, but among female workers, whose mean haemoglobin was 10.8 ± 2.1 gm. per cent., over 12 per cent. showed values between 5 and 7.5 gm. per cent. Hookworm infection did not appear to influence significantly the haemoglobin level of male workers, indeed the mean value of all hookworm-positive cases was slightly higher than for those free of infection. Among women, however, those in the 2 highest egg-count groups showed significantly lower haemoglobin values than the less heavily infected, and the mean value for all hookworm-positive female workers (10.34 gm. per cent.) was significantly lower than in those free of infection. The infected women did not seem able to compensate for blood loss by hookworm when the intensity of infection exceeded 400 eggs per gm. Only in women was hookworm infection of any importance and, even if they were free of this parasite, anaemia due to malnourishment, overwork and chronic disease, would remain a serious problem among women workers.

T. H. Davey

CHERNIN, E. **Problems in Tropical Public Health among Workers at a Jute Mill near Calcutta. V. Eosinophile Levels and their relation to Intestinal Helminthiasis in the Labor Force.** *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 348-55. [14 refs.]

At the same time as the incidence of intestinal parasites was investigated differential white cell counts were carried out among the mill workers with a view to determining the level of eosinophilia. Owing to the large number of persons investigated in a short time only 100 cells were counted in the film from each person. The mean percentage of eosinophiles in the workers was 10.3, in the servants of the senior staff 8.0 and in the supervisors 3.0. Some 80 per cent. of the workers had eosinophilia in excess of 4 per cent. and nearly 8 per cent. had levels of 20 per cent. or higher. Among the supervisors and their servants the eosinophile count was similar in males and females, but among the workers the count in males was significantly higher, 10.5 ± 7.4 per cent. compared with 8.8 ± 6.3 per cent. in females. In both sexes there was a tendency for the level to decline with increased age. Among 571 helminth-positive workers the mean eosinophile level, 10.8 per cent., was significantly but not markedly higher than the mean, 8.7 per cent., for 179 helminth-negative workers. Some 25 per cent. of the helminth-infected and nearly 15 per cent. of those not infected had eosinophilia of 15 per cent. or higher. The eosinophilia among the helminth-positive appears to be related more closely to infection with ankylostomes than with other worms. Only 7.5 per cent. of workers had helminthic infections without ankylostomes and their mean eosinophile level was significantly lower than the mean for all persons with hookworm infection.

Ascariasis and trichiniasis had no significant effect on eosinophile levels for though these infections were very much more common in Muslims than Hindus there was no corresponding difference in eosinophilia in the 2 groups. In India eosinophilia cannot be taken as an index of hookworm or *Strongyloides* infection, for more than 70 per cent. of helminth-free persons had eosinophile levels of over 4 per cent.

T. H. Davey

Foy, H. & KONDI, Athena. **The Haematinic Action of Penicillin in Megaloblastic Anaemia and its Relationship to B₁₂ Metabolism and the Intestinal Flora.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, Jan., v. 48, No. 1, 17-35, 3 figs. [Numerous refs.] Discussion 36-41 [CUTHBERTSON, W. F. J.; COATES, M. E.; WOODRUFF, A. W.; LEHMANN, H.; Foy, H. (in reply)].

In this paper it is reported that 16 cases of megaloblastic anaemia treated with oral or intramuscular penicillin responded in the same way as cases of similar anaemias treated with potent haematinics.

Twenty-four Africans with severe megaloblastic anaemia were treated. Only patients having reticulocytes below 1 per cent. and red blood cell counts below 2,000,000 per cmm. were selected. Their ages ranged from 17 to 40 years, there were 5 males and 11 females, 2 were pregnant, 6 were breast-feeding their infants and continued to do so throughout the period of observation. The patients' diet consisted mostly of maize flour porridge; it contained little animal protein.

In the marrow of all patients there were megaloblasts and giant stab-cells. In some only intermedicate megaloblasts were found and in those the anaemia, nevertheless, was usually severe. The serum in some patients contained large amounts of haematin and the Schumm test was strongly positive, the serum bilirubin ranged from 0.8 to 3.0 mgm. per 100 ml.

No patients showed signs of malnutrition as judged by the amount of subcutaneous fat present, though one is classed as a pellagrin. In some there was oedema of the ankles, legs or back, splenomegaly or hepatomegaly. Very few gave any recent history of malaria. In some cases intestinal parasites were present but no direct correlation was found between such infection and the anaemia or response to treatment. The sickle-cell trait was present in two cases, but was not considered a ground for exclusion from the study; it did not influence the response to treatment. A number of the patients had temperatures between 100 and 103°F. on admission and no cause for this fever was found. Such patients were included in the study as temperatures of this range are common in most anaemias and, it is considered, are not indicative of infection.

All patients were subjected to a control period of 4 to 10 days before treatment was given. They were then treated with 200,000 units of penicillin given orally or 400,000 units of penicillin given intramuscularly daily. In 16 cases there occurred within 24 hours of the commencement of treatment a feeling of well-being and in the majority a maximal reticulocyte crisis occurred between the fifth and tenth days. This therapeutic response was accompanied by reversion from megaloblastic to normoblastic haemopoiesis.

There follows a detailed account of the 16 cases.

Four patients who did not respond to penicillin responded to intramuscularly administered vitamin B₁₂; these patients had a histamine-fast achlorhydria and gastric atrophy. Four others failed to respond to penicillin or to oral or intramuscular vitamin B₁₂ but responded to folic acid. These patients had neither achlorhydria nor gastric atrophy.

Drs. Foy and Kondi then point out that the megaloblastic anaemias of Africans respond in the same way to penicillin as they do to orally administered vitamin B12 or to other known potent haematinics. This response is not dependent on the route of administration of penicillin. There was a close similarity between the action of penicillin and orally administered vitamin B12.

Penicillin fails to induce a therapeutic response in cases which fail to respond to vitamin B12 given orally. Such cases, however, may respond to intramuscularly administered vitamin B12 or to folic acid. In view of this it is suggested that penicillin is not in itself a haemopoietic substance but by its influence on bacteria affects the synthesis, absorption or availability of vitamin B12 in the gut. There follows an interesting and excellent exposition of the objections to this hypothesis and of modern work on the action of antibiotics and diet on intestinal bacteria.

An objection to the hypothesis, it is stated, is the fact that absorptive activity is small in the sites in the gut in which bacterial activity and synthesis of vitamins are greatest. There is evidence, however, that water and inorganic salts, sugars and protein hydrolysates can be absorbed from these regions and it would therefore be extraordinary if water-soluble members of the vitamin B complex were not similarly absorbed. It is also suggested that megaloblastic anaemias in some tropical countries may be the result of the high-carbohydrate low-protein diets eaten producing an environment in the intestine inimical to the synthesis and utilization of vitamin B12.

In the discussion which followed Dr. W. F. J. CUTHBERTSON stated that microbial synthesis of vitamins can occur in the intestinal tract; for example large amounts of the water-soluble vitamins can normally be demonstrated in the faeces. It is clear that some species can take advantage of such biosynthesis, but in man and other animals it is not easy to establish the availability of vitamins produced in this way. The evidence is mainly derived from tests in which antibiotics have been given orally. This work suggests that their action is mediated by the gut flora and it appears that antibiotics may control the availability of various growth factors, in some circumstances increasing and in others depressing the amount which can be absorbed.

Dr. M. E. COATES stated that deficiency of vitamin B12 in chicks results not in anaemia but in a failure to grow. Other as yet unidentified factors associated with vitamin B12 are also essential for normal chick growth. It is therefore conceivable that these factors may be necessary in addition to vitamin B12 for the prevention of some human anaemias.

Professor A. W. WOODRUFF drew attention to the fact that non-megaloblastic macrocytic anaemias are common in Africans. These patients are not suffering from a deficiency of vitamin B12, yet in hospitals and clinics throughout Africa they are commonly treated with this vitamin or with liver extract, considerable sums of money being thereby wasted.

Dr. H. LEHMANN stated that iron deficiency anaemia is predominant at the coast of Kenya where infection with various tropical parasites are common, whereas megaloblastic anaemia is not seen there but in the highlands of that country. He asked whether this difference could be explained by the small chance those at the coast have to develop any other disease than that caused by the predominant parasite in a highly infested area. He suggested that a person does not have the opportunity to produce a fully developed megaloblastic anaemia when at the slightest weakening of the body's defences parasites deflect the course of debility along their own predestined paths.

Dr. Foy, in reply, stated that there are dietary differences between the two regions mentioned, and that it is difficult to assess the relative importance of these and of the difference in the helminthic infection rate.

A. W. Woodruff

HARRIS, F. C. & LOMAX, G. D. **Thalassaemia Minor in an African in the Gold Coast.** *West African Med. J.* 1954, Mar., v. 3 (n.s.), No. 1, 29-31, 1 fig.

A member of the Grumah tribe is described whose red cells appeared to be normal in a preparation of fresh blood, but broke up into "microschistocytes" when added to 0.9 per cent. sodium chloride. Fragility in hypotonic saline was decreased. A male cousin showed the same abnormality. The haemoglobin level was 3.7 gm. per 100 ml. Ascariasis was found and treated and a urethral stricture was dilated. Within one month the haemoglobin level had risen to 9.62 gm. per 100 ml. and within a second month it was 14.4 gm. per 100 ml. The erythrocytes showed the same abnormality after the cure of the anaemia.

[It is difficult to accept this report as a proof of the presence of thalassaemia in a West African Negro. There is no mention of the presence of foetal haemoglobin which would be an important argument in favour of this diagnosis. The single sentence "paper electrophoresis showed that the patient's haemoglobin possessed a decreased mobility as compared with normal haemoglobin", without any further explanation, does not really help, though it may be an important clue.]

H. Lehmann

JELLIFFE, R. S. **The Sickie-Cell Trait in Three Northern Nigerian Tribes.** *West African Med. J.* 1954, Mar., v. 3 (n.s.), No. 1, 26-8.

Three from the more than 250 tribes of Northern Nigeria were examined for the sickling phenomenon. In the Hausa, a mixture of negroid tribes who have probably been in the Northern Region of Nigeria for centuries, 48 sicklaemics were found among 316 persons tested. [This amounts to an incidence of 15.2 per cent. and not of 15.9 per cent. or 15.3 per cent. as stated varyingly in the paper.] The Fulani are descendants of an ancient Asiatic or Egyptian tribe; their lighter colour and semi-semitic features mark them as different from the prevailing negroid stock. Of 184 people examined 17.9 per cent. showed the sickling trait. The Kerikeri are a fairly pure negroid group being part of a tribal division known as the "So". Of 159 examined 10.7 per cent. were found to be sicklaemic.

Though the sickling trait itself is so common, true sickle-cell anaemia is in the author's opinion a rare disease in the Northern Region, even when looked for. During 18 months only one case was observed, in a 5-year-old Fulani girl.

H. Lehmann

SAUNDERS, G. F. T. **Sickle-Cell Disease in General Practice.** *West African Med. J.* 1954, Mar., v. 3 (n.s.), No. 1, 22-5.

The author saw about 1,400 patients within 16 months in general practice in the Gold Coast. Sickle-cell anaemia was diagnosed 24 times; the disease was also suspected to be present in 56 persons, in whom the sickling test, however, was negative. The commonest presenting symptom was not anaemia but severe rheumatism; this was so in 17 patients, in 5 of whom it was associated with recurrent jaundice. Details are tabled and some of the cases discussed.

[The diagnosis was made clinically, and as far as laboratory tests were concerned the positive sickling test seems to have been regarded as sufficient

to confirm the diagnosis of sickle-cell anaemia. Fifty-six patients were suspected of sickle-cell anaemia, but the diagnosis was not made because their blood did not sickle. One wonders therefore how the possibility could be excluded that some of the 24 diagnosed patients did not merely differ from the other 56 by having the sickle-cell trait superimposed on the same diseases. This seems the more likely as "nearly all cases were misdiagnosed at first and were treated according to the misdiagnosis. In all cases . . . there was considerable improvement reported".] *H. Lehmann*

DE VARELA, Hermelinda C. Anemia drepanocitica en el Hospital del Niño de Panamá. [**Sicklaemia in the Children's Hospital, Panamá**] *Archivos Med. Panameños*. 1954, Jan.-Feb.-Mar., v. 3, No. 1, 8-17, 3 figs. [18 refs.]

After general remarks on sickle-cell anaemia, its clinical picture, symptomatology, the blood and marrow changes, the author applies these to 38 cases under his own observation in the Children's Hospital, Panamá; 22 were in boys, 16 in girls, their ages ranging between 2 months and 15 years, 6 (4 males, 2 females) in their first year, 7 (4 and 3) in their 2nd year, 7 (6 and 1) in the 2nd to 5th years, 12 (7 and 5) between 5 and 10 years, and 6 (1 and 5) between 10 and 15 years; 14 were pure Negroes and 24 were half-castes. Sixteen had been repeatedly admitted to hospital, 1 as many as 14 times, for various reasons—acute articular rheumatism, cardiac dilatation with thrill or murmurs, with fever and polyarthritis, surgical emergencies as "acute abdomen", spleno- and hepatomegaly; 3 had pulmonary tuberculosis and 2 pneumococcal meningitis with relapses and 1 periodic convulsions.

Among his conclusions the author states that the condition is associated with a slowing of the blood-flow, congestion of the capillaries and arterioles, conducive to thrombosis and haemolysis; that the incidence is high in Panamá among Negroes and mulattoes; he quotes figures of 8.2 and 13.8 per cent. as being reported by TOMLINSON and CALERO respectively.

H. Harold Scott

VAN DEN BERGHE, L. & BLITSTEIN, I. Etudes hématologiques chez des singes. I. Composition cytologique du sang. [**Haematological Studies in Monkeys. I. Cytological Composition of the Blood**] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 709-29, 2 charts. [27 refs.]

VAN OYE, E. & CHARDOME, M. Etudes hématologiques chez des singes. II.—Note sur le sang et la moelle osseuse chez le jeune gorille. [**Haematological Studies in Monkeys. II. Note on the Blood and Bone-Marrow in Young Gorillas**] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 737-46, 2 diagrams.

VENOMS AND ANTIVENENES

STERN, J. [**Fatal Snake Bites. (A Report of Six Cases)**] *Harefuah*. Jerusalem. 1954, Feb. 15, v. 46, No. 4, [in Hebrew 76-7. English summary 78.]

FINE, J. & EYQUEM, A. Les hémagglutinogènes et les hémagglutinines des sangs de vipères. I.—*Vipera aspis*. [**Haemagglutinogens and Haemagglutinins in the Blood of Vipers. I. Vipera aspis**] *Ann. Inst. Pasteur*. 1953, Sept., v. 85, No. 3, 328-35. [11 refs.]

The authors review the literature on the agglutinin and agglutigen content of the blood of cold-blooded animals. They record the results of

experiments with the serum and red cells of *Vipera aspis* tested respectively against animal erythrocytes (man, cow, sheep, goat, horse, ass, dog and mouse) and sera (man, cow, sheep, goat, horse, cat, dog, rabbit, rat and mouse). They demonstrated the presence of: (a) hetero-agglutinins anti-A and anti-B presenting the characteristics of normal anti-A and anti-B human isoagglutinins; (b) a hetero-agglutinin active against all the main human erythrocyte groups; (c) hetero-agglutinins for various species of animal (cow, sheep, goat, horse, ass and mouse); (d) hetero-agglutinins for erythrocytes of *Vipera aspis* in about half of 63 specimens of human sera examined and in samples of sera from all animals tested except mice. *B. G. Maegraith*

CORAZZI, G. Proprietà fisio-patologiche del veleno di *Bitis arietans* Eritrea. [**Properties of the Venom of *Bitis arietans* from Eritrea**] Estratto dagli Atti I. Congr. Interregion. Estaficano, Asmara, 30 mar.-5 apr. 1952. *Boll. Soc. Ital. di Med. e Igiene Trop. in Eritrea*. Special Number. pp. 392-402. [12 refs.]

The English summary appended to the paper is as follows:—

"The author carries out a study on the antigenic properties of the Eritrean *Bitis arietans*' venom. After testing its toxic action over the various laboratory animals (rabbit, guinea pig and white mouse) he describes the symptomatology and the anatomo-histologic findings; he studies also the enzymatic actions of this venom, concluding that it possesses haemorrhagic, anti-clotting, haemolytic and proteolytic properties."

CORAZZI, G. Ricerche sugli anticorpi del siero anti-*Bitis arietans* Eritrea. [**Studies of Antibodies in Immune Serum Prepared from Venom of *Bitis arietans* from Eritrea**] Estratto dagli Atti I. Congr. Interregion. Estaficano, Asmara, 30 mar.-5 apr. 1952. *Boll. Soc. Ital. di Med. e Igiene Trop. in Eritrea*. Special Number. pp. 410-23, 3 diagrams.

The English summary appended to the paper is as follows:—

"After pointing out the hyperimmunizing treatment made to three horses by the venom of Eritrean *Bitis arietans*, the author relates about the antitoxic values of the three correspondent sera, and also about a series of researches carried out on the principal antienzymatic properties of the sera's specific antibodies."

TOXOPLASMOSIS

KOZAR, Z., DEUŻEWSKI, L., HIRSCHLEROWA, Zofia & JAROSZEWSKI, Z. A Case of Toxoplasmosis complicated by the Cysticercosis of the Brain in an Adult. *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland*. 1953, v. 5, 157-63 [Also in Polish 146-51 & in Russian 151-7.]

JETTMAR, H. M. Zum Bewegungsmodus der Toxoplasmen. [**Mode of Locomotion in Toxoplasms**] *Arch. f. Hyg. u. Bakt.* 1953, v. 137, No. 7, 477-86, 13 figs. [10 refs.]

For the study of locomotion in *Toxoplasma* the parasites were observed in teased-up liver tissue of infected hamsters and in material removed from cultures on chick embryo, both of which were diluted with saline. The fresh preparations were examined on a warm stage (38°C.) by phase microscopy. At the blunt end of the parasites there appears to be a contractile

filament by which it anchors itself to host-cells and débris. The toxoplasms can be observed progressing by gliding movements and dragging behind them the attached fragments, while sometimes they are jerked back by the posterior filament, which behaves like the retractile stalk of Vorticellid ciliates. In other cases the pointed anterior end performs rotating movements around the long axis of the body, or a pair of parasites connected by the filament, go through "dancing" movements. Finally, the author describes a flickering movement at the anterior end of the body, from which fine short filamentar processes emerge, flickering at such a speed that it is impossible to make out their structure or number. Nevertheless, the author regards these structures as flagella, and on the strength of this [? hypothetical] character he even attributes *Toxoplasma* to the Mastigophora.

The movements of these parasites are depicted in a series of free-hand sketches.

C. A. Hoare

DERMATOLOGY AND FUNGUS DISEASES

BENNETT, H. D., MILDER, J. W. & BAKER, L. A. **Coccidioidomycosis—Possible Fomite Transmission.** *J. Lab. & Clin. Med.* 1954, Apr., v. 43, No. 4, 633-6. [14 refs.]

"A proved case of coccidioidomycosis due to *Coccidioides immitis* is presented in a patient never in a known endemic area. Daily contact with dusty materials imported from endemic areas brings up the problem of fomite transmission."

DEL NEGRO, G., MELO E ALBUQUERQUE, F. J., & DE CAMPOS, E. P. *Localização nervosa da blastomicose Sul-Americana (Revisão da literatura e registro de dois casos.)* [**Central Nervous Localization of South American Blastomycosis: Review of the Literature and Report of Two Cases**] Reprinted from *Rev. Hosp. Clin.* 1954, Jan.-Feb., v. 9, No. 1, 64-80, 7 figs. [15 refs.] English summary.

Although not less than 15 cases of South American blastomycosis (Lutz's disease) with involvement of the central nervous system have been reported, no adequate description of the clinical features related to the nervous disorder has been given. The present authors describe 2 cases of South American blastomycosis, in one of which the disease appeared to be confined to the central nervous system and in the other involvement of the brain formed part of a more general infection which responded well to treatment with sulphadiazine.

In the first patient, a male Brazilian aged 35, the disease set in with fever, cough with copious expectoration of yellowish-white, blood-streaked but not foetid sputum, and ill-defined thoracic pain. This condition, the cause of which was not established, eventually cleared up spontaneously but in the meantime the patient developed paralysis of the bladder with retention of urine, bacterial infection and pyelonephritis. There was marked loss of weight, asthenia, weakness and pains in the legs and inability to walk. The cerebrospinal fluid was under increased pressure, it had a very high protein content and a positive Pandy test; spontaneous clotting occurred and Stookey's test indicated a complete blockage. The underlying cause was

not determined. Penicillin and dihydrostreptomycin, and symptomatic treatment, especially the use of antispasmodics, were given but the man died.

At autopsy a condition of granulomatous basal meningitis over the cisternae, pons and bulb was revealed; the temporal lobes showed little whitish granulations but the frontal cortex and meninges appeared to be unaffected. Microscopically, the affected meninges showed an intense histiocyte reaction with large numbers of giant cells containing the spherules of *Paracoccidioides brasiliensis*; a few of the fungal cells showed the characteristic corona of small spores. Some of the spinal nerve roots in the thoracic region presented numerous granulations, discrete or confluent, caused by an infiltration of lymphocytes, plasma cells, histiocytes and giant cells which contained the fungal parasite. The spinal meninges appeared to be unaffected. The infection was confined to the central nervous system. [It seems probable, however, that the initial infection was in the lungs.]

In the second case the patient, a male Brazilian aged 31, suffered from cough with haemorrhagic sputum, wasting, anorexia and asthenia. Radiological and mycological examinations established the diagnosis of South American blastomycosis. Symptoms referable to the central nervous system developed which included headache, giddiness, reduced acuity of vision and hearing, diminished libido and potency, nausea with vomiting, and hemiparesis affecting the left side. Pigmentation of the skin and asthenia suggested involvement of the adrenals.

Examination of the cerebrospinal fluid yielded little information and an electroencephalogram was within the normal limits. Nevertheless a lesion of the right upper frontal lobe was suspected. Under general dietetic treatment and administration of 6 gm. of sulphadiazine daily a remarkable clinical improvement set in and ultimate recovery seemed to be assured.

J. T. Duncan

ROMERO, A. & TREJOS, A. La cromoblastomycosis en Costa Rica. [**Chromoblastomycosis in Costa Rica**] *Rev. Biología Trop.* San José, Costa Rica. 1953, Dec., v. 1, No. 2, 95-115, 1 map & 14 figs. on 5 pls.

The English summary appended to the paper is as follows:—

"A review of the four Costa Rican cases of chromoblastomycosis published to date is presented.

"A comparative study of other cases, confirmed from a mycological viewpoint by the presence of parasites in the lesions, is presented.

"A classification of the various clinical forms is suggested and the previous two classifications are reviewed.

"It is noted that chromoblastomycosis in Costa Rica shows no outstanding differences from that in other American countries."

TROPICAL OPHTHALMOLOGY

MURRAY, N. L. **Trachoma in South Africa.** *South African J. Clin. Sci.* Cape Town. (Incorporating *Clin. Proc.*) 1953, Sept., v. 4, No. 3, 117-203, 4 graphs, 4 maps & 25 figs. (4 coloured). [Numerous refs.]

This is a very interesting and thorough review of the trachoma problem throughout the Union of South Africa. It is apparently the first time such a survey has been made of all the provinces at the same time.

The author is apparently not primarily an ophthalmologist and his interest in this subject arose during several years spent as a district surgeon. He has submitted his findings, photographs and clinical material to other authorities in different parts of the world who have, however, in every case, confirmed the suspicions that the cases he was dealing with were, in fact, trachomatous.

He goes, with commendable thoroughness, into the statistical side so far as it is known, ending with a plea for better statistical methods where ocular conditions are concerned. He deals equally thoroughly with treatment, both medical and surgical, but it is, at times, difficult to make out what the author practised and what is merely a condensation of the work of other authorities.

Nevertheless, it remains a most valuable contribution and one can only wonder that it was not made a good many years ago. It should certainly be valuable to any ophthalmologist or medical officer working among Africans or Cape Coloured persons.

D. P. Choyce

BIETTI, G. B. Acquisizioni recenti e problemi aperti negli studi sul tracoma. [**Recent Studies and Problems Relating to Trachoma**] Estratto dagli Atti I. Congr. Interregion. Estaficano, Asmara, 30 mar.—5 apr. 1952. *Bol. Soc. Ital. di Med. e Igiene Trop. in Eritrea*. Special Number. pp. 257–98. [162 refs.]

MANDIC, L. Sur la classification du trachome. [**On Classification of Trachoma**] *Rev. Internat. du Trachome*. 1954, v. 31, No. 2, 221–34.

TABORISKY, J. La pathologie du trachome. [**The Pathology of Trachoma**] *Rev. Internat. du Trachome*. 1954, v. 31, No. 2, 141–52.

MAJOROS, M. **Etiology and Treatment of Trachoma**. *Rev. Internat. du Trachome*. 1954, v. 31, No. 2, 173–81.

GUPTA, S. P. **Modern Treatment of Trachoma by Chloromycetin**. *Rev. Internat. du Trachome*. 1954, v. 31, No. 2, 182–92.

“Report of 400 cases of trachoma treated by chloromycetin (ointment, drops and capsules).

“At its first stage trachoma is cured in 100 p. cent with the ointment at 1 p. cent.

“Untimely interruption produces relapses. Chronic trachoma is very variably affected following its clinical aspect and the race of the patient. Importance of climate and surroundings (ointment at 1 p. 100, 5 times a day).

“Surgical treatment must be associated to chloromycetin in case of large follicles, entropion, trichiasis, acute pannus and corneal ulcers.

“If relapses occur, repeated cures every 6th or 8th week are necessary.

“Relations between the concentration of chloromycetin in blood and urine.

“The author emphasizes the efficiency of this treatment.”

DECOUR, H., FERRAND, G. & REINHARDS, J. Incidence sur l'évolution du trachôme du traitement "de masse" des conjonctivites épidémiques par l'aureomycine à 1% en instillations. [**Effect of Mass Treatment of Epidemic Conjunctivitis With 1 per cent. Aureomycin Ointment on the Development of Trachoma**] *Bull. Inst. Hyg. Maroc.* 1952, v. 12, Nos. 3/4, 153-72, 3 charts. [24 refs.]

The authors came to the following conclusions as a result of their experience:

(a) In South Morocco, where the "trachoma-bacterial" complex affects the entire population, in spite of powerful seasonal exacerbations due to acute epidemic conjunctivitis, the trachoma ends in certain cases in spontaneous healing.

(b) Such seasonal epidemics of conjunctivitis, due to Koch-Weeks bacillus, is a well known aggravating factor in trachoma, and it is easy during the epidemic period to bring the evolution of trachoma towards cure by instillation of 1 per cent. aureomycin ointment twice daily on three consecutive days in each month. This procedure results in a higher level of cured trachoma than is otherwise seen in a population living under the same conditions, but where this prophylactic treatment is not carried out.

(c) The fact that clinical cures of trachoma are not necessarily final, but that re-infection may occur during the massive infections which abound during the seasonal epidemics of conjunctivitis, leads the authors to think that these prophylactic measures should be, so far as is possible, continuous.

D. P. Choyce

See also p. 805, PARLANGE, *Revue clinique et thérapeutique sur la lèpre oculaire* [**Clinical and Therapeutic Review of Ocular Leprosy**]

HEAT STROKE AND ALLIED CONDITIONS

THOMSON, M. L. **A Comparison between the Number and Distribution of Functioning Eccrine Sweat Glands in Europeans and Africans.** *J. Physiology.* 1954, Feb. 26, v. 123, No. 2, 225-33, 2 figs. [21 refs.]

Sweat produced by the eccrine glands provides the major avenue of heat loss when the temperature of the air and surroundings exceeds that of the skin. The author investigates the alleged superiority of the Negro sweat mechanism and makes a comparison between the number and distribution of functioning eccrine glands in 21 Europeans and 26 Africans. The plastic impression method was used whereby a solution of plastic is applied to the test area and, when dried, is removed by attaching transparent adhesive tape: holes in the plastic reveal the active glands, which can be readily counted [this *Bulletin*, 1954, v. 51, 221]. Accurate anatomical counts of sweat gland ducts of 23 subjects were made on pieces of blistered skin removed from the hip area after local application of cantharides plaster. There was a significant correlation between these counts and those of the above functioning gland technique.

To produce steady sweating, the 47 subjects undertook a step-climbing routine of metabolic cost 120 to 140 k.cal./m²/hr. in an environment of 91°F. equivalent temperature. The 2 races did not differ significantly in their average regional distribution of eccrine glands. The average numbers of sweat glands per sq. cm. of skin were: (1) hand, forehead 238, (2) foot 183.2, (3) arm, forearm 113.4, and (4) abdomen, scapula, lumbar region,

thigh, chest and leg 88.2. The exact area distribution is unknown, the value of the distribution is not apparent and there was great individual variability.

Africans had a lower rate of sweating (weight loss 181.7 gm./m²/hr. for Africans and 248.9 gm./m²/hr. for Europeans), a lower terminal rectal temperature (100.28°F. Africans, 100.65°F. Europeans), and a higher skin temperature (97.32°F. Africans, 96.62°F. Europeans). They therefore appear to have a better heat dissipating mechanism. *Barbara Tredre*

MISCELLANEOUS DISEASES

BALL, J. D., WILLIAMS, A. W. & DAVIES, J. N. P. **Endomyocardial Fibrosis.** *Lancet.* 1954, May 22, 1049-54, 4 figs. [22 refs.]

Endomyocardial fibrosis is a form of heart disease which is prevalent in Uganda and probably in other parts of Africa. It is characterized clinically by cardiac enlargement and rapidly progressive congestive failure without any obvious antecedent cause, and pathologically by extensive fibrosis of the endocardial aspect of the ventricles, often with thrombus formation over the fibrotic area.

From time to time, isolated or small groups of similar cases have been reported in Europe and America where they have been regarded as a rare form of myocardial disease of unknown causation. In 1946, BEDFORD and KONSTAM (*Brit. Heart J.*, 1946, v. 8, 236) described a series of 40 cases occurring in African troops serving in the Middle East and coming mainly from West Africa but also from East Africa. In 1948, DAVIES [this *Bulletin*, 1949, v. 46, 575] reported the pathological findings in a series of very similar cases occurring in Uganda and named the condition "endomyocardial fibrosis". It affects East and Central African tribes and especially those from Belgian Ruanda-Urundi, and is a relatively common cause of heart failure in Uganda.

Most patients already had advanced congestive failure when first seen, and the duration of symptoms from the onset to death was usually less than a year. The blood-pressure was normal or low. The clinical signs were those of gross cardiac enlargement with triple rhythm and, in about half, with mitral incompetence. A few had tricuspid incompetence. Sometimes the clinical picture simulated that of pericardial effusion or constrictive pericarditis. The electro-cardiogram was always abnormal but not characteristic, except that auricular fibrillation was only once recorded.

The pathological findings consisted of cardiac dilatation with moderate hypertrophy, and subendocardial fibrosis sometimes confined to small patches but often involving almost the whole of one or both ventricles, and presenting a pearly white appearance. The fibrosis sometimes involved the papillary muscles and the mitral and tricuspid valves, the cusps of which became adherent to the ventricular wall, thus causing incompetence. In the right ventricle, the fibrosis tended to obliterate the apex and part of the cavity, constituting an "endocarditis obliterans". The aortic and pulmonary valves were never involved and the coronary arteries were always healthy.

The response to routine treatment for heart failure was disappointing and those showing temporary improvement soon relapsed. The average duration of life after admission to hospital was a matter of weeks or months. Diagnosis, in Africa, had to be made mainly from tuberculous pericardial effusion and rheumatic heart disease.

Now that endomyocardial fibrosis has been established as a clinical and pathological entity it will probably become recognized in many parts of Africa. BECKER and others (*Circulation*, 1953, v. 7, 345) have already described a condition of endocardial necrosis and fibrosis, occurring in Bantus, which they regard as belonging to the group of diffuse collagen diseases, and GILLANDERS (*Brit. Heart J.*, 1951, v. 13, 177) has described nutritional heart disease in South Africa associated with cirrhosis of the liver, and in which there is cardiac dilatation and failure with minimal or no fibrosis, but parietal thrombosis is sometimes found.

The authors do not discuss the aetiology, as they state that they have little evidence to offer. The fact that this disease is common in Africa naturally raises the question of malnutrition and avitaminosis, and this has been suspected in some cases reported from America. However, the fact that the disease occasionally affects well-nourished Europeans who have resided in Africa or the tropics suggests that some form of infection or parasitic infestation may be responsible, and an allergic causation has also been postulated on account of eosinophilia.

D. Evan Bedford

DASLER, W. **Partial Protection against Odoratism (Sweet Pea Lathyrism) by Diets High in Gelatin or Casein.** *Proc. Soc. Exper. Biol. & Med.* 1954, Mar., v. 85, No. 3, 485-8, 1 fig.

"High levels of gelatin and of casein delayed, but did not prevent, the onset of odoratism (experimental lathyrism) in the rat. Casein exerted a greater protective action than gelatin."

LEVINE, H. B., DOWLING, J. H., EVENSON, Margery & LIEN, O. G., Jr. **Growth of *Malleomyces pseudomallei* in Simple Chemically Defined Media.** *J. Bacteriology.* 1954, Mar., v. 67, No. 3, 350-52.

LE GAC, P., COURMES, E. & BRES, B. Note préliminaire à l'étude des colonies muqueuses du bacille de Whitmore. [**Preliminary Note on the Study of Mucoid Colonies of Whitmore's Bacillus**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 41-3.

The authors isolated strains of Whitmore's bacillus with mucoid colonies from some of their cases of melioidosis in the Far East. The colonies, which were at least 6 mm. in diameter, showed an oily iridescence and could have been mistaken for those of Friedländer's bacillus. Their appearance was favoured on Sabouraud's medium. They were usually found along with colonies of the normal smooth and rough types, and subcultures from them showed a mixture of mucoid and normal types. The strains isolated from the blood reverted to the normal type at the first subculture. The mucoid strains fermented glucose, lactose and mannitol in 3 days, with reversion to alkalinity about the seventh day, a point not observed with normal strains.

J. C. Cruickshank

CHAMBON, L., DE LAJUDIE, P. & FOURNIER, J. Étude de la sensibilité du bacille de Whitmore aux antibiotiques *in vitro* et chez les malades atteints de mélioiïdose. [**A Study of the Sensitivity of Whitmore's Bacillus to Antibiotics *in vitro* and in Patients with Melioidosis**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 139-53, 4 figs. [19 refs.]

The literature relating to the sensitivity of Whitmore's bacillus to antibiotics is reviewed, and an account is given of a study by a diffusion and a

tube method of the sensitivity to 5 antibiotics of 31 strains from cases of melioidosis in Saigon. Penicillin and streptomycin were inactive, and aureomycin and oxytetracycline had only slight activity. Chloramphenicol had the greatest activity. It was bactericidal to most strains in a concentration of about 15 $\mu\text{gm.}/\text{ml.}$ and bacteriostatic in lower concentrations. Blood levels of 3–20 $\mu\text{gm.}/\text{ml.}$ are ordinarily attained in treatment. A few resistant strains were encountered. For these a combination of chloramphenicol with aureomycin or oxytetracycline may be worth trying, though this was not effective against strains whose chloramphenicol resistance had been acquired *in vivo*. Otherwise little or no useful synergic effect between chloramphenicol and the other antibiotics was observed.

Chloramphenicol was used in the treatment of 10 cases of melioidosis and found to be the most effective drug. Four patients with pulmonary and one with urinary tract localization, and one with septicaemic manifestations without detectable localization were cured, though 2 of the pulmonary cases relapsed and required a second course of chloramphenicol. Another urinary case was progressing favourably at the time of writing. A pulmonary case due to a chloramphenicol-resistant strain responded to aureomycin. The other 2 patients died. One of these had also a staphylococcal septicaemia resistant to all the antibiotics; the strain infecting the other case developed resistance to chloramphenicol in the course of treatment and was found to be resistant also to aureomycin and oxytetracycline. *J. C. Cruickshank*

DE FIGUEROA TABOADA, M. **Pulmonary Acariasis in Spain.** An Illustrative Case Report. *Brit. Med. J.* 1954, Feb. 20, 437–8, 2 figs. [11 refs.]

Mites (Acarina) have been found in the sputum of patients suffering from hypereosinophilic respiratory disorders in Ceylon, England, the Netherlands West Indies, East Africa, etc. The author came across similar cases in Spain (*Med. Colon.*, 1946, v. 8, 214) and in the present paper describes one such case of pulmonary acariasis. The patient worked in a food store and had asthma of 7 months' duration. The total leucocyte count was 32,000 per cmm. of which 36 per cent. were eosinophiles. Examination of the sputum showed *Carpoglyphus* mites, a photograph of which is given in the text. Routine antispasmodic therapy brought no relief and the patient was therefore put on Acetarsol tablets. Clinical control of asthma was effected by the 10th day and on the 30th day the leucocyte count had dropped to 10,000 per cmm. with 6 per cent. eosinophiles.

Some of the more outstanding characteristics of this type of respiratory disorder due to mites are the high eosinophilic count, the variability of the pulmonary radiological appearances, the dramatic response to arsenical therapy and, of course, the presence of mites in the sputum. According to the author, an examination of the sputum in cases of respiratory disorders with a high eosinophilia may reveal the presence of mites in countries outside the tropical zone. Most of these mites are found in stored food products, which makes it possible for them to be taken into the respiratory tract of people who deal in such commodities. *M. G. R. Varma*

LUCASSE, C. & BORGERS, G. Acariadiase humaine du tractus urinaire. [**Acariasis in the Human Urinary Tract**] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 451–6, 1 fig. on pl.

Mites belonging to the family Tyroglyphidae [probably *Tyroglyphus longior* Gervais] were found by the authors in the urine of 5 patients, in

one case for as long as 17 months. Besides dead and living adult mites, eggs and embryos were also recovered from the urinary sediment. A short description and photograph of the adult mite are given. In obtaining urine for examination, all reasonable precautions were taken to avoid contamination. The urinary symptoms were sometimes either slight or totally absent; when present, the predominant symptom was pain in the region of the right kidney. In one case there was eosinophilia in the beginning due to *Loa loa* infection, and in another with high fever there was leucopenia and lymphocytosis. Examination of the urinary sediment sometimes showed hyaline or granular casts and 2 patients had traces of albumin and some erythrocytes in the urine. Two of the patients presenting other symptoms in addition to urinary ones were treated with various antibiotics which, however, appeared to have no effect on the mites. *M. G. R. Varma*

USBORNE, V. M. **Hypochromotrichia on Ukara Island.** *East African Med. J.* 1954, Feb., v. 31, No. 2, 55-7, 1 graph.

Failure of normal pigment formation in the hair is often considered to be a nutritional disorder. This is common in the children and adolescents in certain districts in the neighbourhood of Lake Victoria. On Ukara Island there was a maximum incidence of 30 per cent. in boys aged 10-14 years, whereas in Kwimba inland the maximum, 50 per cent., occurred in infants. Girls were less affected than boys. Hypochromotrichia was found in apparently healthy children and was not associated with nutritional disorders. The roots were usually affected and so the origin must have been recent. But neither the cause nor the significance of this minor abnormality has been determined. *R. Passmore*

PARASITOLOGY: GENERAL

LAMY, L. & LAMY, H. Données actuelles sur le parasitisme intestinal et sanguin des différentes populations africaines de l'agglomération de Brazzaville. [**Statistical Data concerning Intestinal and Blood Parasites of African Population Groups in Brazzaville**] *Ann. Inst. Pasteur.* 1954, Apr., v. 86, No. 4, 465-78, 2 charts & 3 graphs.

This enquiry was conducted between August 1952 and March 1953, and included children and adults attending dispensaries and other centres in the parts of Brazzaville—Poto-Poto, Bacongo and Ouenzé: 2,850 stool and blood examinations were made on 1,511 persons. Stools were examined in normal saline and iodine, and in certain negative cases, by concentration methods, or culture, or after staining with iron haematoxylin. Blood was examined fresh for microfilariae and by thick and thin films stained in May-Grünwald-Giemsa. The results are shown clearly in a series of tables and graphs, and can scarcely be summarized. The most interesting features were as follows:—*Entamoeba histolytica* was completely absent in children under a year old, but 8 per cent. of both older children and adults were infected. Other intestinal protozoa were equally uncommon. Helminthic infection was higher, though low in infants; *Ascaris* reached 55 per cent. in older children and ankylostomes 69 per cent.—schistosomiasis was absent. Malaria was represented almost entirely by *Plasmodium falciparum*; parasite rates in infants were 33 per cent., in older children 52 per cent., and

in adults 15 per cent. The youngest child with malaria was aged 2 months. Microfilariae chiefly belonged to *Dipetalonema perstans*, though there were a few *Loa loa*; practically only adults were infected (10–15 per cent.)—only 2 boys 12 years old showed microfilariae in 1,100 examinations of children.

P. C. C. Garnham

LIZANO, Cecilia & DE ABATE, J. Incidencia de parásitos intestinales en los niños de la Sección de Pediatría del Hospital San Juan de Dios. [**Incidence of Intestinal Parasites in Children in the Paediatric Department of the San Juan de Dios Hospital, Costa Rica**] *Rev. Biología Trop.* San José, Costa Rica. 1953, Dec., v. 1, No. 2, 223–33. [20 refs.]

LAWLESS, D. K. **A Rapid Permanent-Mount Stain Technic for the Diagnosis of the Intestinal Protozoa.** A Preliminary Report. *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 1137–8.

The author describes a new simple method for the rapid fixation and staining of intestinal protozoa in faecal smears. The whole procedure occupies 2½ minutes, producing permanent preparations, in which the protozoa are coloured as in those stained with iron haematoxylin. A solution is made up as follows (in cc. per cent.): acetone 5, glacial acetic acid 5, formaldehyde solution (USP) 1, Schaudinn's fluid 89. To this solution are added 125 mgm. of acid fuchsin and 50 mgm. of "fast green FCF". The resulting reagent remained stable for 2 months.

The preparations are made as follows: a faecal smear is spread on a slide; while it is still moist, it is covered with the solution; the slide is heated over a flame until it begins to steam (but does not boil); it is then washed with running tap water, and dehydrated progressively through alcohols: 30 seconds each in 50 and 70 per cent., and 15 seconds each in 95 and 100 per cent., after which the slide is cleared in xylol (1 minute) and mounted in Canada balsam.

By this method both trophozoites and cysts of amoebae and flagellates are stained. It is suitable for routine diagnosis of intestinal infections, and can be safely used by technicians.

C. A. Hoare

BRINGMANN, G. & HOLZ, J. Elektronenmikroskopische Befunde über Kleinformen der Sarcosporidien. [**Electron Microscopic Appearances of Small Forms of Sarcosporidia**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 139, No 4, 309–16, 7 figs.

DI PIETRO, P. Attività antiprotozoaria della terramicina. [**Activity of Oxytetracycline Against Protozoa**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Feb., v. 35, No. 2, 74–84. [56 refs.] English summary (4 lines).

A review of the literature.

PRIETO LORENZO, A. Orientaciones en la lucha contra los parasitismos intestinales humanos en España. [**Indications for dealing with Human Intestinal Parasitism in Spain**] *Med. Colonial.* Madrid. 1954, Apr. 1, v. 23, No. 4, 327–83, 7 figs. [53 refs.]

This long article is of general interest in pointing out the reasons for the high incidence of intestinal helminths [other parasites are not spoken of] among dwellers in Spain. We say "of general interest" because the many infections—for all the common helminths are found—appear to be unusually

rife in Spain, but no actual figures of prevalence are quoted though remarks are made of the existence of each in turn, cestodes, nematodes and trematodes, and the reasons for their prevalence: climatic, the nature of the soil and the amount of rainfall, and social, the occupation of the people, largely agricultural and horticultural, the widespread poverty, the many insanitary dwellings, overcrowding and illiteracy of many. Remedial measures entail more thorough examination of the people, more laboratories, increase of capable examining staff and educational measures with better sanitation. Forms to be filled in for return to the Government are given, such as the number of persons examined in a locality and the numbers found infected, the index of infection by sex and age, the census of latrines. These examinations should be free and also treatment of the infected, more latrines should be erected and the people trained to use them while the heavily contaminated soil is being dealt with. [This account of existing conditions reveals little that is new, but the whole subject is set out in an interesting manner.]

H. Harold Scott

HOEPLI, R. **Some Early Views on Parasites and Parasitic Infections shared by the People of Borneo, Malaya and China.** *Proc. Alumni Ass., Malaya.* 1954, Mar., v. 7, No. 1, 3-17. [30 refs.]

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

BURTON, G. J. **Suggested Improvements for an Unbreakable Aspirator and Killing Tube.** *Mosquito News.* 1954, Mar., v. 14, No. 1, 27-30, 3 figs.

RAGEAU, J. **Les noms vernaculaires des insectes au Cameroun Français.** [The Vernacular Names of Insects in the French Cameroons] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1099-112.

MELLANBY, K. **Acclimatization and the Thermal Death Point in Insects.** [Correspondence.] *Nature.* 1954, Mar. 27, v. 173, 582-3.

Earlier work by the author demonstrated that the chill-coma temperature of insects could be altered by exposing them to higher (or lower) temperatures for 24 hours before depressing the temperature to induce the inactivity characteristic of chill-coma. Chill-coma temperature could be altered within a range as much as 7.5°C. [see also COLHOUN, below]. Similar results have now been obtained for the limits of insect activity and survival at high temperatures. Acclimatization temperatures need only influence the insects for 20 hours to give detectable changes in the heat-coma temperature and the thermal death point. Thus mealworm larvae die after a one-hour exposure to 44°C. if previously kept at 37°C. for 24 hours but death occurs at 42°C. when they have been accustomed to 30°C. Findings for *Aedes aegypti* were similar. Insects which, as a result of acclimatization, survived the high temperatures which were lethal to controls, showed inhibition of development. Moulting and pupation were delayed—but not prevented.

This may be due to the destruction of internal secretions essential to these processes. It is pointed out that the temperature conditions of the experiments are of a kind which may often affect insects in nature. This could lead to unexpected appearances of vectors of diseases or pests of stored products following delayed development induced by high temperatures.

D. S. Bertram

COLHOUN, E. H. **Temperature Acclimatization in Insects.** [Correspondence.] *Nature*. 1954, Mar. 27, v. 173, 582, 2 figs.

This is a preliminary note on thermal acclimatization in the cockroach, *Blattella germanica*. It shows that cockroaches kept at 35° and 25°C. become inactive when exposed to temperatures of 7°C. and a little more than 5°C., respectively, but that chill-coma does not occur until nearly 4°C. in roaches previously kept at 15°C. There is, however, a limit to this acclimatization effect for roaches kept at 10°C. have the same chill-coma temperature as those kept at 15°C. A corresponding effect on survival at 7°C. is reported, the insects previously kept at 15°C. surviving longer at 7°C. than those accustomed to 25° or 35°C. Irreversible signs of nervous disorders are apparent in insects which have been immobilized for some time by cold [see MELLANBY, above].

D. S. Bertram

KITZMILLER, J. B. **Mosquito Genetics and Cytogenetics.** *Rev. Brasileira Malariologia*. Rio de Janeiro. 1953, Oct., v. 5, No. 4, 285-359, 5 figs. [Numerous refs.]

Mosquitoes, in virtue of their medical importance, have been studied intensively for many years and there is a vast fund of knowledge on the morphology of the adults and of the immature stages, particularly the larvae, besides a wealth of information on the bionomics of many species. Moreover, numerous species have been bred as laboratory cultures for many years, providing material for laboratory investigations into many aspects of mosquito biology and physiology, apart from studies with them as vectors of disease organisms. In the past two decades problems in subspeciation of important species have developed steadily to a stage at which genetic principles were clearly involved. There is need, and scope, to continue this type of study but it is now apparent that it must be supported, if possible, by investigations on the cytology of the group. Until recently, this subject has barely been touched. The author in this paper provides a comprehensive collation of a great deal of literature but, as is pointed out, with the intention of exposing gaps in our knowledge and indicating the progress which seems possible rather than merely recording what is known in a factual review.

One of the remarkable features about mosquitoes is that very few mutants have been isolated in the many cultures of numerous laboratory-bred species. A white-eyed mutant of *Culex molestus* has been studied genetically and, in the author's own cultures of *C. fatigans*, a mutant known as "heldout" (the adult's wings never fold back properly when at rest) and a lethal mutation expressed in the form of black larvae have been observed and studied. These characters in *C. fatigans* appear to be controlled by 2 or 3 genes. It may be that mutations affecting fine points of morphology do occur but have not been detected. Readily detectable mutant characters would be, as in *Drosophila*, invaluable in further progress in the

cytogenetics of mosquitoes and artificial induction of mutation by X-rays seems to be a field of endeavour for the immediate future. Given successful results, the way is open to chromosome maps and correlation of chromosome behaviour and mechanics with the segregation of morphological characters. Recently, beginnings in the mapping of chromosomes have been made for the *A. maculipennis* group and, by the author, with *Culex pipiens* and its allies. These are promising but already the need for similar work on as many species (and genera) as possible is clear. The author believes that the material which mosquitoes offer is suitable for the work envisaged. The chromosomes are large and few (usually a diploid number of 6); in certain larval and pupal tissues the large-banded salivary-type chromosomes occur which are so useful for locating gene positions and modifications of chromosome structure. The mechanics of chromosome behaviour appear to be sufficiently consistent with phenomena in other groups well understood cytologically that the future of mosquito genetics and cytology can, in the author's view, be anticipated with legitimate hopes and not a little confidence.

The bulk of the text of the paper is a very condensed abstraction of relevant literature, supported by a number of tables and figures. Some of the author's unpublished observations on *C. fatigans* are inserted. There is a good deal of repetition of factual matter but this is the author's choice as inevitable to the discussion of different aspects of the whole subject. Subdivision of the text by headings eases the burden of the reader. It is impossible to summarize the facts of the paper adequately. The interested reader should consult it in the original for its value as a review and an appraisal. Some of the subjects dealt with include the genetic significance of cross-mating results within species-groups such as *C. pipiens* and its allies, *Aedes aegypti* and *Aedes albopictus*, the *Anopheles maculipennis* group, *A. gambiae* and *A. melas*, besides others. There is a discussion of the evidence for genetical control of susceptibility of mosquitoes to infection with malaria and filarial parasites; the genetic basis of insecticide-resistance; cytoplasmic inheritance; and gynandromorphs. Most of the figures help to clarify the text on chromosomes, their number, shape and variations in form, and the recent progress in mapping their bands in *A. maculipennis*. Mitosis and meiosis are described so far as information permits at the present time.

D. S. Bertram

BRENNAN, J. M. & MAIL, G. A. **A Technic for shipping Live Mosquitoes with particular reference to *Culex tarsalis*.** *Science*. 1954, Apr. 2, v. 119, 443-4.

Experience in the isolation of viruses from mosquitoes has demonstrated the desirability of fresh material for test purposes. Consequently the following technique was given several trials in the USA over distances up to 800 miles, and times from packing to unpacking up to 60 hours.

The mosquitoes are put into a cylindrical muslin bag having a bobbinet window at one end. The muslin surrounds two $4\frac{1}{2}$ -inch Monel wire rings held in position by a straight wire $8\frac{1}{2}$ inches long. The bag holds up to 300 mosquitoes and is closed with rubber bands. One or two bags of mosquitoes are placed in a carton having a refrigerating medium in a separate compartment. The remaining space is packed with insulating material. This carton is then placed inside another larger carton which is again packed with insulating material and sealed, wrapped, labelled and forwarded.

The refrigerant is "a harmless, odorless substance holding liquid in colloidal suspension". It is in a "cylindrical plastic skin about 10 by 2 in., sausage-like in appearance, freezing at 30°F. These can be frozen either in deep-freeze units or more quickly with dry ice, and can be reused indefinitely".

The effectiveness of the refrigerant decreases gradually up to 50 hours and by 75 hours is lost. At 3 days the survival rate of mosquitoes may be 80 per cent. or less; at 4 or 5 days it may be nil. Despite the time limit thus imposed the authors feel the technique has its uses and they feel encouraged to recommend it.

H. S. Leeson

BRENNAN, J. M., RUSH, W. A. & HUBERT, A. A. **The Present Status of the *Culex tarsalis* Colony at the Rocky Mountain Laboratory.** *Mosquito News*. 1954, Mar., v. 14, No. 1, 26.

See this *Bulletin*, 1953, v. 50, 1170.

FERGUSON, F. F. & MCNEEL, T. E. **The Mosquitoes of New Mexico.** *Mosquito News*. 1954, Mar., v. 14, No. 1, 30-31.

"This preliminary report summarizes the native mosquito fauna of New Mexico for the first time and lists *Culex tarsalis*, *Culiseta inornata*, *Aedes dorsalis*, and *Aedes nigromaculis* as the most common forms studied during two recent seasons of trapping in northeast New Mexico."

FROHNE, W. C. **Mosquito Distribution in Alaska with especial reference to a New Type of Life Cycle.** *Mosquito News*. 1954, Mar., v. 14, No. 1, 10-13.

Disregarding rare species and others of uncertain occurrence the list of mosquitoes so far known from Alaska includes species of *Aedes* (18), *Culiseta* (5), *Culex territans* and *Anopheles* (?) *occidentalis*. They are all able to survive the winter and take advantage of the short summer and none of them has more than one brood in a year. Two kinds of life cycle exist; in one group, of about 18 species, 8-10 months of the individual's life of about a year are spent as embryonated eggs which hatch in Spring in a characteristic sequence of species. In the other group of species eggs are laid in May-June, they hatch in 5 days or so and adults appear in about a month. Mating takes place, the males soon die, and the inseminated females, without feeding, remain dormant for 9-10 months. These females then become active in March-May, feed and 2 weeks later lay eggs. Thus, in this second group of species, part of the female's activities belong to her first summer and quite another kind of behaviour to her second summer.

The author briefly compares the mosquitoes of 3 regions of Alaska; from the arctic (represented by collections made at Umiat); from the subarctic (collections at Anchorage) and from the temperate region (collections from Juneau). He finds that in the arctic region there are 3 or more species of *Aedes* which have the first kind of life cycle, while in the other regions both kinds of life cycle occur. In the arctic the biting season is less than a month, in the subarctic about 4 months and in the temperate region it lasts more than 5 months.

H. S. Leeson

SAILER, R. I. & LIENK, S. E. **Insect Predators of Mosquito Larvae and Pupae in Alaska.** *Mosquito News*. 1954, Mar., v. 14, No. 1, 14-16.

BROWN, A. W. A. **Studies on the Responses of the Female *Aedes* Mosquito. Part VI.—The Attractiveness of Coloured Cloths to Canadian Species.** *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 67–78. [11 refs.]

This work was carried out in Labrador to estimate the attractiveness of materials worn by the armed forces to *Aedes* mosquitoes; also to investigate the physical principles which determine the attractiveness of coloured surfaces to these insects.

Thirty-two different cloths including woollen flannels, dyed to Munsell standard colours, satins, fluorescent satins, black crêpe, nylons and serges, were compared for their relative attractiveness. The tests were carried out on robots maintained at a water temperature of 98°F. and clothed in a felt undershirt, and also upon army personnel. The comparisons were made singly, one cloth with another from the same group, and then collectively between a number of cloths in a group and finally, comparison between the 2 best cloths of each group was made upon army personnel. In another series of experiments the 4 groups of cloths were rotated on robots, first similarly, then with the order changed, and finally after shuffling.

The final ratings of attractiveness for cloths on both personnel and robots are listed as percentages and show a fairly close agreement. The final rating is averaged from these two sets of figures.

The table shows the most attractive materials to be:—

| Type of cloth | Personnel | Robots | Average |
|--|-----------|--------|---------|
| | % | % | % |
| Cloth, cotton drill, satin (work clothing), black | 100 | 100 | 100 |
| Cloth, worsted serge, 9 oz. (navy blue) | 100 | 87 | 94 |
| Dark red Munsell 2.5 R 3/8 | 96 | 78 | 87 |
| and the least attractive materials:— | | | |
| Cloth, nylon canvas (S298) green ... | 15 | 7 | 11 |
| Cloth, nylon canvas (S298) OD7 olive | 12 | 5 | 8 |
| Luminescent arc yellow | 3 | 11 | 7 |

Measurements of the reflectivities of the cloths show that those with the least reflectivity are the most attractive to mosquitoes and that the majority of those with high reflectivity are unattractive. The correlation, however, is not regular and this is attributed to the great variety of materials and the texture of cloths used.

For colour values of similar lightness or darkness, the attractiveness to *Aedes punctator* and associated species was black, red, blue, brown, green, white, yellow.

Anne Hudson

KELLER, J. C. & CHAPMAN, H. C. **Tests of Selected Insecticides against Resistant Salt-Marsh Mosquito Larvae.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 1004–6.

In 1949, it was found that DDT was no longer effective against the salt-marsh mosquitoes, *Aedes taeniorhynchus* and *Aedes sollicitans*, in Florida, because the mosquitoes had become DDT-resistant [this *Bulletin*, 1951, v. 48, 412, *bis*]. This discovery revived the interest in the other chlorinated hydrocarbons and some phosphorus compounds.

Field and laboratory tests were conducted in 2 areas in Brevard County,

Florida (1950-52). One of the areas was intensively treated with DDT and BHC for several years and had highly resistant larvae as well as adults. The other was treated occasionally with the same insecticides and the larvae were moderately resistant.

Methods: Third- and fourth-stage larvae were collected for laboratory tests and exposed to acetone-water suspensions of the toxicants at concentrations ranging from 0.05-0.0005 p.p.m. Mortality counts were taken after 24 and 48 hours of exposure at 70°F. Small-plot field tests were carried out with a small hand atomizer, applying insecticides in emulsions to give a range of dosages from 0.1 to 0.0025 lb./acre. Air spraying tests were also made on a larger scale, with both emulsions and oil solutions of the toxicants; the concentrations were varied to give the desired dosage. In both types of field methods results were based on dipping counts before and 24 hours after treatment.

Results (Laboratory Tests): Results are given in a table which shows the order of effectiveness of the insecticides used against larvae from the intensively treated areas, as follows:—EPN > dieldrin > heptachlor > parathion = aldrin > lindane > toxaphene > chlordane > DDT > malathion > tetrapropyl dithiopyrophosphate. Larvae from the intensively treated areas were more resistant to all the insecticides than larvae from the occasionally treated areas. However, the order of toxicity was the same for both, except that toxaphene was more effective than lindane in the latter areas.

Results (Field Tests): For the small-plot field tests, a second table is given which shows that EPN and parathion were the most effective insecticides, both giving a nearly perfect control at 0.01 lb./acre, followed by heptachlor equal to dieldrin, lindane, chlordane, DDT, malathion, TEPP, tetrapropyl dithiopyrophosphate. In the air spraying tests, lindane, dieldrin and heptachlor, in the occasionally treated areas, gave nearly a complete kill at 0.1 lb./acre. DDT at double this dose gave only 89 per cent. reduction. In the intensively treated area, DDT and aldrin only were used; DDT at 0.4 lb./acre gave 77 per cent. reduction and aldrin at 0.2 lb./acre gave 0 per cent. reduction.

G. R. Shidrawi

CHAPMAN, H. C., KELLER, J. C. & LABRECQUE, G. C. **Relative Effectiveness of Several Insecticides as Sprays and as Fogs against Salt-Marsh Mosquito Adults.** *Mosquito News*. 1954, Mar., v. 14, No. 1, 1-5.

“Extensive field tests were conducted in 1951 and 1952 to compare the performance of several types of spray and fog machines when applying different insecticides against adults of the salt-marsh mosquitos *Aedes taeniorhynchus* (Wied.) and *sollicitans* (Wlkr.).

“In 1951 lindane was slightly more effective than dieldrin and both were superior to DDT regardless of the type of equipment used. A fog machine (Dyna-Fog) gave the best results when winds were less than 5 miles per hour and the poorest at wind speeds over 10 miles, whereas the reverse was true with a jeep-operated mist sprayer. A Hession Microsol sprayer was most effective at wind speeds of 5 to 10 miles per hour.

“In 1952 BHC (40% gamma) was slightly more effective than heptachlor, and both were considerably better than DDT, dieldrin, and chlordane. There was little consistent difference in effectiveness between the Lawrence Aero-Mist, Hession Microsol, and jeep sprayers and a Kyoritu fog machine at wind speeds of less than 1½ miles per hour, which prevailed throughout the tests.”

ARVY, Lucie. Données sur la leucopoïèse chez *Musca domestica* L. [Data on Leucopoiesis in *Musca domestica*] *Proc. Roy. Entom. Soc. of London*. Ser. A. 1954, Apr. 5, v. 29, Pts. 1/3, 39-41, 1 fig.

PIATKOWSKA, Wanda & SKIERSKA, Barbara. **Qualitative, Composition and Seasonal Quantitative Fluctuations of Flies in Gdansk.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland*. 1953, v. 5, 254. [Fuller version in Polish 237-53, 7 charts & 1 fig. (17 refs.) & in Russian 253-4.]

"The material was collected in the period from April 1 to October 1, 1951. The flies were caught by means of fly-traps and fly-paper. The fly-traps were set in courtyards, while the fly-paper was hung about in dwellings.

"The collection obtained by means of fly-traps differs essentially from that acquired by means of fly-paper. The flies caught in fly-traps are chiefly represented by the family Calliphoridae, of which the species *Borcellus terrae-novae* constitutes 57.1% of the total fly-trap collection, while the principal representative of the fly-paper collection is the species *Musca domestica* which makes up 56.83% of the latter collection. In both collections, during the whole spring-summer period, only one maximum occurs; the maximum of 'fly-trap' flies takes place in July, while 'fly-paper' flies are most numerous in August. It was observed that the number of flies is dependent on temperature, saturation deficit, and wind velocity. In the various quarters of Gdańsk there are considerable differences in the numbers of captured flies, the lowest quantities occurring in the city-quarters bordering directly upon the sea.

"Exceptionally favourable conditions for the existence and development of flies are to be found at collective eating-houses. There has been observed a close dependence between the number of flies caught in fly-traps ('rubbish dump' flies) and the morbidity rate pertaining to typhoid and paratyphoid fever and also between the number of flies caught on fly-paper ('house' flies) and the morbidity rate of summer diarrhoea in children. A reduction in the number of flies may contribute towards a lowering of the morbidity rate with regard to some infectious diseases of the alimentary tract.

"The latter conclusion indicates the usefulness and importance of anti-fly action."

SACCÀ, G. Sulla biologia invernale di *Musca domestica* L., in Italia centrale. [On the Winter Biology of *Musca domestica* in Central Italy] *Rendiconti Istituto Superiore di Sanità*. Rome. 1954, v. 17, Pt. 1, 44-54, 3 figs. English summary.

Some interesting observations on the survival of house-flies through the winter have been made in the Pontine area in Central Italy. Flies were found overwintering as adults in a refuse tip situated at some distance from any houses: they had been able to survive by sheltering in pockets of fermenting refuse which maintained a continuously warm temperature. Metal parts of an adjacent building containing waste paper reached a temperature of 18°-25°C. and flies were crowded on to this, pairing frequently. All stages of larvae were found in the refuse. Sheltering adults were found up to the middle of January and newly emerged flies at the end of February. Some of the newly emerged adults were much darker in colour, a condition which was brought about in the laboratory by retarding the development of pre-imaginal stages at low temperatures.

Observations on farms showed that a small number of flies were always present as adults but, curiously, very few larvae were located in manure

heaps. A few were found in animal bedding in a cattle stall where the temperature was constantly above 20°C.

Laboratory experiments showed that a small percentage of adult flies could survive under suitable conditions for periods up to 84 days. In the pre-imaginal stages development could be retarded by low temperatures to a maximum period of 90 days.

Anne Hudson

GAHAN, J. B., ANDERS, R. S., HIGHLAND, H. & WILSON, H. G. **Baits for the Control of Resistant Flies.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 965-9.

The failure of chlorinated hydrocarbons to control resistant house-flies has resulted in the need for alternative control measures. This paper describes laboratory and field tests of various poison baits. A large number of materials had been tested as potential attractants for fly baits and the best were molasses and brewers' malt. Further experiments were needed to find the most effective poison. In the laboratory tests, 2 replicates of 25 flies were enclosed in small cages with a cotton plug wetted with 1 ml. of various poison solutions. In a duplicate series, 5 per cent. malt was added to the bait. In tests of 11 inorganic and 4 organic compounds at different concentrations the following gave complete kills:—0.2 per cent. TEPP; 0.25 per cent. sodium fluoroacetate; 0.5 per cent. sodium arsenate and 1 per cent. sodium arsenate. In some of the higher concentrations, especially of TEPP, there was slight reduction of mortality due to repellence. In most cases the baits containing malt were more effective than those without. Tests with baits aged for one or two days suggested that malt retained its attractiveness longer than molasses.

Some field trials were done in dairy barns heavily infested with flies resistant to chlorinated hydrocarbon insecticides. Sodium arsenate was tried at 2 per cent. mixed with 48 per cent. water and 50 per cent. malt or molasses. Pads soaked in 2 kgm. of this mixture were placed in 10 metal pans, 11 in. in diameter and 4 in. deep, at various points about the barns. Flies coming to fresh unpoisoned baits in Petri dishes were counted on 3 days before the trials and 2 to 5 days in each week during the trials. The poison baits were renewed weekly, for 4 weeks. The results showed about 80 to 90 per cent. control with molasses and 89 to 97 per cent. reduction with the malt bait.

Other trials were done with a bait containing TEPP. Since this insecticide loses its toxicity very rapidly in aqueous solution, it was used as follows. A solution containing 0.05 per cent. TEPP and 3 per cent. molasses was watered over the barn floors daily, in places where the flies congregated. The degree of control was variable but was usually from 60 to 90 per cent.

It is considered that these trials have been promising, especially the sodium arsenate bait pans, which were fairly convenient and gave control comparable to that formerly achieved by DDT. The baits should be protected from domestic animals by wire grids as they are poisonous and should be fastened securely to prevent spilling their contents.

J. R. Busvine

PERRY, A. S., FAY, R. W. & BUCKNER, Annette J. **Dehydrochlorination as a Measure of DDT-Resistance in House Flies.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 972-6, 3 figs. [11 refs.]

Comparison of degrees of DDT-resistance in house-flies by medial lethal doses is not very satisfactory, because very different figures can be obtained

by different methods [cf. BUSVINE, this *Bulletin*, 1952, v. 49, 89]. This appears to be largely due to the fact that the penetration of DDT is not proportional to the dosage applied, if volatile solvents are employed.

It has been shown by several workers that resistant flies are able to convert DDT to the non-toxic DDE; whereas normal flies either cannot do so, or only at a low rate. The authors suggest that the rate of degradation of DDT might be used as a measure of resistance of a strain of house-flies. To investigate this, they worked with 4 different resistant strains and one normally susceptible. Doses of 6.8 microgrammes per fly were applied topically in acetone solution to groups of female flies. At the end of 2, 4 and 8 hours batches of flies were killed and analysed for the quantities of DDT which had penetrated, and the amounts converted to DDE. The average figures for 3 to 5 tests appear to show that the rate of penetration of DDT differed in the various strains. After 2 hours, 0.86 microgramme had penetrated into one strain, whereas the other 4 closely approximated to 1.1 microgrammes; after 8 hours the amounts penetrating ranged from 1.73 to 2.66 microgrammes in different strains.

The figures for percentage degradation of DDT never exceeded 10 in susceptible flies, but rose to 70 or 80 per cent. in some resistant strains. The rate of degradation fell off progressively and the 2-hour figure is considered most significant, particularly as most flies were normal at that time. Good correlation between percentage degradation at 2 hours and survival after 24 hours was found, suggesting the following criteria:—

| Percentage DDT converted | Resistance level |
|-----------------------------|------------------|
| 0-10 | None |
| 11-20 | Slight |
| 21-35 | Moderate |
| 36-55 | Medial |
| 56-75 | High |
| 76 | Extreme |

J. R. Busvine

BABERS, F. H. & PRATT, J. J., Jr. **Resistance of Insects to Insecticides: the Metabolism of Injected DDT.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 977-82, 1 fig. [19 refs.]

The literature relating DDT-resistance in house-flies to chemical degradation (to DDE) is briefly reviewed. It appears that there is considerable doubt as to the importance of this phenomenon as a *cause* of resistance. An improved technique for further investigation of this question is described. A highly resistant fly strain was used, about 30 per cent. of which could be killed by application of 200 microgrammes of DDT (in acetone) to the thorax; higher doses gave no greater kills. The MLD of the susceptible strain was 3 microgrammes per fly.

Doses of 7.5 to 60 microgrammes of DDT were injected into batches of resistant flies. These doses produced variable mortality, not correlated with dose (8 to 19 per cent. after 24 hours and 16 to 33 per cent. after 48 hours). Estimations of DDT and DDE were made from individual flies, when doses were above 20 microgrammes per fly, and from batches, at lower doses. The results showed that the percentage of DDT metabolized to DDE fell as the dose increased. The maximum was 17 per cent. in flies surviving 48 hours after the lowest dose. At the highest dose, no DDT was converted

to DDE. The proportion of DDT recovered ranged from 66 to 92 per cent. and was not related to dosage.

Resistant flies were able to survive while containing up to 48 microgrammes of DDT, while, in the susceptible flies, a mortality of 95 per cent. followed injection of 1 microgramme.

The authors conclude that chemical degradation of DDT is not the principal mechanism of resistance in house-flies. *J. R. Busvine*

KIRK, R. & SATI, M. H. *Phlebotomus and Disease*. Estratto dagli Atti I. Congr. Inter-region. Estaficano, Asmara, 30 mar.-5 apr. 1952. *Boll. Soc. Ital. di Med. e Igiene Trop. in Eritrea*. Special Number. pp. 212-19.

MITRA, R. D. & ROY, D. N. *Phlebotomus squamipleuris* var. *poonaensis* nov. var. (Diptera: Psychodidae). *Ztschr. f. Parasitenk.* 1954, v. 16, No. 3, 191-4, 6 figs.

MUIRHEAD-THOMSON, R. C. The Identity of "Eye-Flies" in Assam. *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 121.

The name "eye-fly" in Assam is usually employed in reference to *Siphunculina funicola*, which is attracted to ulcers and to nasal and ocular discharges: its seasonal incidence coincides closely with that of Naga sore and of epidemic conjunctivitis. Characteristically, it clusters in large numbers on odd pieces of thatch hanging from roofs.

Observations by the author in Assam some years ago suggest that there may be some confusion in identity. An insect which hovers irritatingly in front of the eye is often called "eye-fly", but it is not in fact *Siphunculina*, but a biting midge which resembles it. The hovering erratic movements of this midge are quite different from the leisurely movements of *Siphunculina*, and they cause the midge to pass backwards to the ears or neck where biting takes place. Where there are no ulcers or discharges it is probable that in most cases the insect referred to as "eye-fly" is this biting midge.

Specimens of the midge sent from Assam on 4 occasions in the months of January, February and June, were identified as *Lasiohelea lefanui* var. *squamipes*. This species is also found in Africa and in New Britain.

H. J. O'D. Burke-Gaffney

GOLEM, S. B. & OR, C. *Ornithodoros lahorensis* sokmasından mütevellit entoksikasyonlar. [Toxic Effects of the Bite of *Ornithodoros lahorensis*] *Türk İjiyen ve Tecrübi Biyoloji Dergisi*. Ankara. 1953, v. 13, No. 3, 231-7. [French summary 237-9.]

This paper describes the effects of the bite of the tick *Ornithodoros lahorensis* on man. Of the 7 persons bitten, 3 did not suffer from any toxic effects apart from a local reaction and itching. The other 4 showed various toxic symptoms. Pain at the site of the bite occurred in all. The burning and itching, which were at first confined to the bitten spot, gradually spread over the body and in one case the burning sensation was felt even in the internal organs. Swelling of the eyelids and lips, diarrhoea, vomiting, haematuria and involuntary urination were also observed. The symptoms were characterized by their sudden onset and disappeared after some hours except the swelling of the face which lasted for 3 days and the diarrhoea which in one lasted for 24 hours. The bites did not produce any lasting effects apart from weakness, and the persons were able to continue their

work the next day. The authors were not able to demonstrate any toxic effect on guineapigs, rabbits or lambs as a result of bites by these ticks and they believe that the effect on some persons is due to their hypersensitivity to the toxin of the tick.

The text is in Turkish, and included in the French summary is a table of the observed symptoms with the number of cases in which they occurred.

M. G. R. Varma

FISK, F. W. & ISERT, J. A. **Comparative Toxicities of certain Organic Insecticides to Resistant and Non-Resistant Strains of the German Cockroach, *Blattella germanica* (L.).** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 1059-62, 1 fig. [11 refs.]

Two resistant strains were investigated. One was originally produced by selective survival after DDT in the laboratory (GRAYSON, *J. Econom. Entom.*, 1951, v. 44, 315, and 1953, v. 46, 124); the other was collected in the field from an area in Texas where chlordane had been much used and was failing to be effective (HEAL *et al.*, *J. Econom. Entom.*, 1953, v. 46, 385). Colonies of these 2 strains were obtained and reared at 25°C. The median lethal doses of various insecticides to these cockroaches, and to normally susceptible ones, were measured by a droplet application method, with a 4:1 mixture of kerosene and acetone as solvent. The results showed the following degrees of resistance in the 2 resistant strains:—*DDT-selected strain*: DDT \times 1.9; chlordane \times 1.8; dieldrin \times 1.2; "Diazinon" \times 2.4; synergized allethrin \times 1.7. *Chlordane-resistant strain*: DDT \times 1.4; chlordane \times 109; dieldrin \times 68; "Diazinon" \times 1.2; synergized allethrin \times 1.3.

The resistance of the DDT-selected strain seems to be rather general and of a low order. It is much lower than found by GRAYSON (*loc. cit.*) which may be due to a decline during 9 generations in the absence of selection [or may be partly due to a different test method]. The chlordane strain shows associated resistance to dieldrin but the other differences are probably not significant.

J. R. Busvine

HORNSTEIN, I. & SULLIVAN, W. N. **The Role of Chlorinated Polyphenyls in Improving Lindane Residues.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 937-40.

Lindane (99 per cent. *gamma* BHC) is a highly effective residual insecticide, but owing to its volatility it is not very persistent. To increase the persistence of residual insecticides, experiments have been made on their incorporation in various paints and varnishes; but, in general, these greatly reduce their insecticidal powers. One of the most promising combinations was a solution of insecticide in urea-formaldehyde resin [BLOCK, *Bulletin of Hygiene*, 1948, v. 23, 621]. The insecticides form supersaturated solutions and slowly crystallize out on the surface. Wiping the surface clean results in the growth of a fresh "bloom" of crystals. However, such supersaturated solutions are unstable and mechanical shock may cause crystallization *inside* the resin; or the surface may become hardened with time and prevent the extrusion of new crystals. In either case, the insecticidal value will then decline rapidly.

The authors suggest the use of chlorinated polyphenyls as a film medium for the insecticide lindane. This produces a finish with a slightly "tacky" surface allowing the insecticide to migrate to the surface easily. This

material is inert, resistant to oxidation, non-flammable and does not allow fungal growth. It reduces the vapour pressure of lindane according to the ratio of the two in the mixture. Thus, a 1:10 mixture of insecticide and polyphenyl suppresses the volatility of lindane to about 12 per cent. normal. This greatly prolongs the residual action of the lindane but does not prevent it from retaining insecticidal action due to the vapour phase.

Various methods of applying the lindane and chlorinated polyphenyl mixture have been investigated, with the object of applying superficial films on porous materials. One way of doing this is to spray the mixture dissolved in a low-boiling pressurized solvent, such as methylene chloride. This solvent evaporates very rapidly, and the highly viscous particles of the mixture which remain have little tendency to penetrate into the porous material. Another method is to wet the surface to be treated with water and spray on acetone solutions of the mixture. The latter is precipitated out of solution as soon as the spray hits the wet surface, and does not soak into the pores. However, this leaves a rather unsightly deposit

J. R. Busvine

YEO, D. & THOMPSON, B. W. **Aircraft Applications of Insecticides in East Africa. V.—The Deposition in Open Country of a Coarse Aerosol released from an Aircraft.** *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 79–92, 4 figs. [14 refs.]

Deposition of insecticide from aerosols emitted by aircraft is very much affected by atmospheric turbulence. This complex relationship may be divided into 2 parts; the effects of turbulent air in open spaces, and the effects of air currents in woodland [*cf.* THOMPSON, this *Bulletin*, 1954, v. 51, 472]. This paper is concerned with the former aspect of the problem.

The sedimentation of particles through the air may be disturbed by eddies due to wind deflections by ground irregularities. These increase with wind speed and become more and more violent when complicated by convection currents during super-adiabatic conditions. The degree of air turbulence may be related to wind speed and temperature gradient by a factor *F*, similar to "Richardson's number". This indicates the point at which atmospheric conditions change from those in which turbulent eddies tend to increase (negative values) to those in which they tend to die out (positive values).

This factor is used in interpreting a study of the deposition from aircraft of aerosol sprayed at about 30 feet above open ground in Tanganyika. The solution sprayed was 10 per cent. DDT in a 50:50 mixture of power kerosene and diesolene; it also contained a red dye. The aeroplane flew at 110 m.p.h. and emitted the spray at 150 lb. per sq. in. from 24 nozzles on a boom under the wing. Ground recoveries were estimated (i) by colorimetric estimation of the dye on sample papers; (ii) by drop marks on slides coated with magnesium oxide, and (iii) by a cascade impactor.

The droplet spectra of deposits on the slides showed a mass mean diameter of 80 μ (range 5 to 250). Cascade impactor records showed that a very large number of droplets of the original sprayclouds were below 5 μ , though scarcely any of them were deposited. Their total volume, however, was so low that they contained less than 5 per cent. of the DDT in the aerosol.

The deposition at various points down-wind across the line of flight was recorded. Apart from the area close to the line of flight, the deposit fell off in a logarithmic manner with increasing distance from the flight track.

The proportion of DDT actually deposited (estimated from dye measurements) was strongly correlated with the turbulence factor *F*. Thus, the proportions recovered in 90 seconds ranged from 0.15 with high turbulence to 0.6 with almost still air. It is clear that high turbulence is unsatisfactory for air-spraying. But non-turbulent conditions, though giving a heavy ground deposit, may result in patchy distribution; this might give untreated zones where the distance between flight tracks was high, but would not be serious with runs about 60 yards apart. It is also noted that winds are often variable in direction under fairly calm conditions.

A comparison of the estimations of ground deposit by dye (non-volatile) and droplet marks (giving volume deposited) allows the calculation of the evaporation which has occurred from the original solution. The deposit immediately below the aircraft had lost about 50 per cent. volume and there was a steady decline farther from the flight track. This subsequent decline was, however, small; and it seems that most of the evaporation of the spray used occurred within the first few seconds after emission.

The factors affecting the dosage of aerosol received by an insect are discussed. It is shown that both the amount acquired by sedimentation and the amount impacted by horizontal air movement are likely to be 3-4 times greater during strong inversions than with high superadiabatic lapse rates.

In general, it is concluded that, in tropical Africa, there are only short periods of daylight during which aerosols may be applied effectively.

J. R. Busvine

HEWLETT, P. S. **A Micro-Drop Applicator and its Use for the Treatment of certain Small Insects with Liquid Insecticide.** *Ann. Applied Biol.* 1954, v. 41, No. 1, 45-64, 3 text figs. & 6 figs. on 2 pls. [14 refs.]

REPORTS AND SURVEYS

CONGO BELGE. Fonds Peine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge. Rapport sur l'Activité durant l'année 1952. [DRICOT, C., Médecin-Directeur du Fonds en Afrique.] [**Report of the Activities of Foréami during 1952**] 118 pp., 16 figs. on 8 pls., 4 maps (1 folding), 2 charts & 7 diagrams. [1953.] Brussels: 39, Rue du Commerce.

The experimental programme of preventive and curative medicine carried out by FORÉAMI [this *Bulletin*, 1954, v. 51, 657] has passed through the stages of census and medical census to preventive and curative measures, with present emphasis on the latter. The population of the area has increased to 709,619, of whom 639,375 were submitted to routine examination and who made 705,801 dispensary visits and 40,165 visits to infant welfare centres in 1952. It is noted that the inhabitants have lost their suspicion and now appreciate medical work. The crude death rate is 22.24 per 1,000 and when classified by ages the rates per 1,000 are:—

| | | | | | | |
|--------------|-----|-----|-----|-----|-----|--------|
| 0 to 1 years | ... | ... | ... | ... | ... | 112.48 |
| 1 to 3 " | ... | ... | ... | ... | ... | 42.55 |
| 3 to 15 " | ... | ... | ... | ... | ... | 14.38 |
| 15 to 45 " | ... | ... | ... | ... | ... | 14.45 |
| 45 and over | ... | ... | ... | ... | ... | 54.06 |

The birth rate was 36.93 per 1,000 and the natural increase 14.69 per 1,000.

The incidence of disease is classified; recorded epidemic diseases including dysenteries were extremely rare. Trypanosomiasis was found in 0.31 per cent. of those examined; leprosy in 0.33 and yaws in 0.08, the incidence of these diseases showing little change. Statistical data are given about other diseases.

The report includes as usual some original scientific contributions. DELARGE describes in full detail the organization of a campaign of pentamidine prophylaxis against trypanosomiasis. LEJEUNE gives the result of a preliminary enquiry on the prevalence of sickle-cell trait which was discovered in 14.1 per cent. of 276 infants and in 12.1 per cent. of their mothers. There was a definite indication of a difference in incidence between tribes. BROU discusses a new vermifuge of unstated composition; he also reports on the conversion of previously Mantoux negative persons by BCG vaccination. It seems very probable that the vaccine may be inactivated by ultra-violet light during and immediately after its inoculation. Three areas are compared, in 2 of which the vaccine was given in shade and in 1 of which it was given in the open sunlight. In the first 2 areas conversion was secured in 80.8 per cent. and 79 per cent., and in the last in 53.33 per cent.

[The report is much concerned with classification of work which is largely of a personal and curative nature. The reviewer hopes to see one day a detailed analysis of the child mortality. The death rates quoted would result in the death of 32 per cent. of children before 15 years of age, about 4 times as many as in Belgium; this is the crux of the health situation both here and elsewhere in Africa and it deserves detailed study. The report is illustrated by photographs of institutions, etc., but the reviewer thinks he has found 5 separate photographs of identical houses.] (G. Macdonald)

McLEITCH, J. L. **Medical Field Units in Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, Mar., v. 48, No. 2, 156-82. [58 refs.]

Mobile medical teams were organized by the Nigerian Sleeping Sickness Service some 20 years ago to diagnose and treat human trypanosomiasis. Subsequently their scope was enlarged to include vaccination, the treatment of yaws, scabies, ulcers and cerebrospinal fever. In 1944 a new all-purpose mobile service was planned and in 1946 the first unit was recruited and trained. This article gives an account of the organization and functioning of this service during the past 8 years. At first it was placed under the same control as the Sleeping Sickness Service but when the present regional organization came into being in 1951 the Mobile Field Units were divided between the 3 regions.

The main function of the new service was to supply medical facilities to sparsely populated areas too poor to afford an adequate dispensary system. Recruits with an elementary standard VI education were educated for a further 11 months at a special primary school. The best candidates were then trained in laboratory work for a year and the others received 3 months' instruction which might be repeated. Refresher courses lasting 2 months were given every 2 or 3 years to those transferred from the Sleeping Sickness Service and more advanced training was given to candidates seeking promotion. Special courses on entomology and malaria control, parasitology, record-keeping and snail identification were also included in the basic training, and finally those in training were given field instruction under experienced medical officers. Instruction in general medicine was simple.

broad and practical, and was designed to produce a "general factotum" rather than a specialist.

An important duty of the units was to assist in controlling serious outbreaks of disease, and the epidemics dealt with have included cerebrospinal fever, smallpox, yellow fever, and lesser outbreaks of relapsing and enteric fevers and of conditions of doubtful aetiology. Some comments are made on the practical experience gained in these. In regard to the planning of curative and preventive services it was realized that these must be based on surveys to determine the extent and severity of disease and sub-standard health. Some fact-finding morbidity surveys were carried out by the units and further detailed work may be required to ascertain the conditions which are most damaging to the public health and to the local economy. The methods employed in these surveys are described and sample survey findings in several provinces are recorded. It is clearly recognized that the rôle of the Nigerian field units in endemic disease is to be a spearhead because the service is too small to control or eradicate major community diseases. Its main function is to focus attention on rural problems and the more urgent needs, and to organize and participate in remedial experiments and efforts. A brief account is also given of the medical services specially designed for rural areas in other territories.

T. H. Davey

EAST AFRICA HIGH COMMISSION. **East African Medical Survey. Departmental Annual Report No. 4, 1952** [LAURIE, W., Director]. 107 pp. 1953.

The East African Medical Survey was set up to determine the actual state of health of rural populations, which it does by sample surveys. These include selection of areas in which there are carried out physical and pathological examinations on a high proportion of the inhabitants; histories of maternities and the fate of infants are taken from women; tuberculin sensitivity surveys and dietary surveys are carried out and dispensary records examined. The present report records in detail surveys in Ukara Island, Bukoba and Kwimba, elaborating previous records [this *Bulletin*, 1953, v. 50, 171]. Ukara was chosen as a densely populated area with a growing population; Bukoba as an area of apparently declining population, and Kwimba as a typical district.

The results are recorded in some detail. The fertility and reproduction rates are of particular interest. In Ukara the total female fertility rate is about 4.4; 70 per cent. of children survive to 20 years, and the net reproduction rate is about 1.4. In Bukoba the equivalent figures are: 2.7, 63 per cent., and 0.8 to 0.9; in Kwimba: 3.6, 68 per cent., and 1.07 to 1.15. The differences are great and the surveys indicate that the prime controlling factors are social and relate to the stability of family life. The people of Ukara have greater physical handicaps of over-population and disease incidence than those of Bukoba but they have a firm tribal and family structure, whereas in Bukoba the ties are very loose and promiscuity and prostitution are almost universal. The Kahn reaction does not indicate a direct influence of syphilis, but gonorrhoea may be the direct agent in reducing fertility and increasing child mortality.

The Bukoba and Kwimba surveys include detailed analyses of diets and dietary habits, that for Ukara being brief. The results of physical and pathological examinations are set out in a number of tables, some of them showing the frequency of dual conditions.

[The report describes much work which can throw considerable light on the hitherto unknown health conditions of rural peoples and in this way

justifies the survey. The method of presentation, however, leaves something to be desired in its diffuseness and literary style. The result of each survey is a great mass of data, but this deserves analysis and classification in a way which would greatly reduce its volume, together with a deeper examination of its implications.]

G. Macdonald

AUDY, J. R. **A Biological Approach to Medical Geography.** *Brit. Med. J.* 1954, Apr. 24, 960-62.

Symptoms and signs are best considered jointly rather than singly as they often fall into coherent patterns or syndromes characteristic of particular diseases. The author develops the thesis that in community studies disease and parasite infestation should be considered in the same way, as patterns of incidence rather than according to the presence or absence of individual conditions. He exemplifies the point by reference to the characteristic disease patterns of desert people but develops it largely by reference to arthropod parasites on man and lower animals. The infestation pattern is much more closely related to the immediate geographical background of the animal than to its zoological status. A number of examples of alteration of pattern with change of environment are quoted. Man's disease pattern is originally influenced primarily by climate acting either directly or indirectly by modification of vegetation and living habits. It is, however, further modified by his development as a town dweller and later by the growth of industry. Viewed in this way medical geography can make a material contribution to knowledge.

G. Macdonald

LOGAN, J. A. **Status of Insect and Rodent Control in Public Health.** Reprinted from *Centennial Transactions Amer. Soc. Civil Engineers*, 1953, v. CT, 634-48, 5 figs. [13 refs.]

This is a paper by an engineer to a Society of Engineers and it is a significant mark of the greatly enlarged scope of public health engineering in the USA that the subject is handled as it might be before a medical society, without special reference to mechanical procedures. The author briefly describes the part played in history by insect-borne diseases, and the growth of knowledge culminating in an appreciation of the rôle of insects and the possibility of their control. He then illustrates happenings in a "golden era" since the discovery of the new insecticides with particular reference to the control of typhus, malaria and the mosquito-borne diseases and the ectoparasites of rodents. In conclusion emphasis is laid on the fact that environmental sanitation must form an integral part of plans for community development and must include insect control. However, a great emphasis should be placed on both biological and chemical research and on the integration of all forms of environmental sanitation with other varieties of social and economic development.

[The paper is well illustrated pictorially and by quotation; it is an admirable and up-to-date summary.]

G. Macdonald

KHAJURIA, H. **Catalogue of Mammals in the Zoological Survey of India. I. Primates: Hominoidea.** *Rec. Indian Mus.* 1952, June, v. 50, Pt. 2, 129-45. [12 refs.]

NATH, B. **On a Collection of Mammals from Assam (India) with special reference to the Rodents.** *Rec. Indian Mus.* 1952, Dec., v. 50, Pts. 3/4, 271-85, 1 map. [20 refs.]

BOOK REVIEWS

ROSEVEAR, D. R. **Checklist and Atlas of Nigerian Mammals with a Foreword on Vegetation.** 131 pp., 40 pls. & 241 coloured maps (2 folding). 1953. Lagos: Govt. Printer. London: Crown Agents for the Colonies, 4, Millbank, S.W.1. [10s.]

Although the title implies that this work is concerned only with Nigeria, a good deal of information about vegetational associations and mammalian distribution for West and Central African territories (Senegal to Uganda) is included. This wider scope is presented in a coloured map of the vegetation zones of these lands and an even wider cover is provided for each mammal by indicating in the text its distribution for all Africa. Particular emphasis to mammalian distribution in Nigeria is given in about 240 small maps each showing for a single species its known distribution and probable range in the territory. A larger-scale, coloured map shows the limits of the principal vegetation zones in Nigeria, rivers, place names and political boundaries, etc. The small maps conveniently repeat the natural features and commoner place names. Some 30 pages of foreword define the vegetational zones, which are clearly illustrated in 40 good photographs, and discuss their history and changes due to shifting cultivation and regeneration. The influence of these current modifications on animal dispersal is pointed out by examples. Brief sections deal with climate, special habitats and faunal barriers in Nigeria. The checklist is set out in full zoological classification with, for each species, data on range, habitat, frequency, type locality and subspecies besides the common and scientific name. *D. S. Bertram*

CALDER, Ritchie [C.B.E.]. **Men against the Jungle.** 231 pp., frontispiece, 37 figs. on 15 pls. & 1 folding map. 1954. London: George Allen & Unwin Ltd., 40, Museum Street, W.C.1. [15s.]

The Technical Assistance Programme of the United Nations is an international venture which hitherto has been recorded in official reports only. This book is an account, in popular form, of work being done in 7 Asian countries. Its material has already been widely publicized by radio, television, cinema and press and it is not the type of book that is normally reviewed in this *Bulletin*. It is included, however, because it is a heartening record of the work being done by the United Nations and because it lays stress on the need to tackle the problem of raising living standards from medical, sociological and economic standpoints simultaneously. The book may well shock the layman (for whom it is primarily written) by its account of conditions which prevail for such a large proportion of the world's population, but its somewhat breathless enthusiasm may lull him into thinking that the amelioration of such conditions is simpler than it is.

John Rathborn

ALPHABETICAL LIST OF AUTHORS OR SOURCES

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